

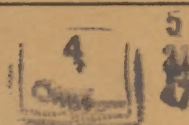
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WAR DEPARTMENT FIELD MANUAL

CHEMICAL



DECONTAMINATION

COMPANY

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WAR DEPARTMENT FIELD MANUAL
FM 3-70

CHEMICAL
DECONTAMINATION
COMPANY



WAR DEPARTMENT • 1 SEPTEMBER 1944

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Washington 25, D. C., 15 July 1944

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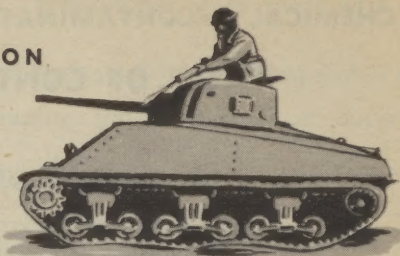
CHEMICAL DECONTAMINATION COMPANY

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FIRST ECHELON

DECONTAMINATION
BY USING
PERSONNEL



SECOND ECHELON

DECONTAMINATION
BY SPECIALLY
DESIGNATED
PERSONNEL



THIRD ECHELON

DECONTAMINATION
BY SPECIALLY
TRAINED AND
EQUIPPED TROOPS



Fig. 1. Echelons of Decontamination

CHAPTER 1

MISSION AND ASSIGNMENT

1. INTRODUCTION. a. **The enemy uses gas** to cause casualties and impede our progress. He knows that nonpersistent gases can halt us only a short time because they have a minor effect on terrain or materiel. He often resorts, therefore, to persistent gases such as lewisite and mustard gas, which have a much more lasting effect. When used liberally and dispersed widely, these gases produce casualties and may halt necessary activities until decontamination has been effected.

b. **Decontamination** is not always undertaken in battle, because the tactical situation may not permit delay. Moreover, combat troops usually have adequate protection. But in service areas at the rear, agencies of supply and maintenance may lose vital time and materiel unless decontamination is accomplished immediately.

2. MISSION. a. **The primary mission** of the chemical decontamination company is decontamination of service installations. This is known as *third echelon* decontamination. The company's personnel are trained, organized, and equipped to perform this mission with the greatest possible efficiency.

b. **There are also secondary missions**, but the company's personnel and equipment may be used for such missions only if they do not interfere with the primary mission of third echelon decontamination. For example,

the company may be called upon to assist when the contamination is too extensive to be handled by regular *second echelon* maintenance or decontamination personnel.

c. Other miscellaneous missions include use of the 400-gallon power-driven decontaminating apparatus for hauling water, to provide field bathing facilities, to fight fires, to pump certain liquids, and to wash vehicles. Personnel of the company are trained in use of their equipment for such missions.

3. ASSIGNMENT. No definite basis of assignment is provided, but a suggested basis is one company per 100,000 strength.* In practice, assignment is determined by the tactical situation. A minimum number of companies is assigned in theaters where gas is not employed, the number being increased as warranted in the event of imminent or actual gas warfare. Decontamination companies are always supervised by the highest echelon chemical officer, usually corps or army.

4. LOCATION. a. Normally, since they specialize in third echelon decontamination, companies in the field are located at a central point in the service area, near the chemical depot company and chemical maintenance company. Detachments are thus readily available for dispatch to any threatened or affected area.

b. At other times it may be desirable to place detachments at the rear of units in combat, or even to attach them to such units. At no time, however, should dispositions be so extensive that enough troops are not immediately available to deal promptly with any gas situation which may develop in the service area.

* Chemical service troops assigned to a task force are usually grouped in a Chemical Warfare Service Organization. The decontamination section of this unit performs the same functions for a task force that a decontamination company performs for a larger force.

5. COORDINATION WITH OTHER SERVICE UNITS. **a. Responsibility** for coordinating work of the decontamination company with that of other service units rests with the chemical officer. The company commander or platoon commanders coordinate their functions with those of commanding officers and chemical officers of units to which they are assigned or attached.

b. As a general rule, the company may be used to assist any service unit in decontamination work when the chemical officer believes such employment is justified by the seriousness of contamination. The following limitations will be observed:

- Decontamination personnel are not normally used in forward areas, because they are more urgently needed to decontaminate rear-area installations.

- Employment of the company within range of enemy small arms, or of light or medium artillery fire, is inadvisable because the power-driven apparatus is highly vulnerable.

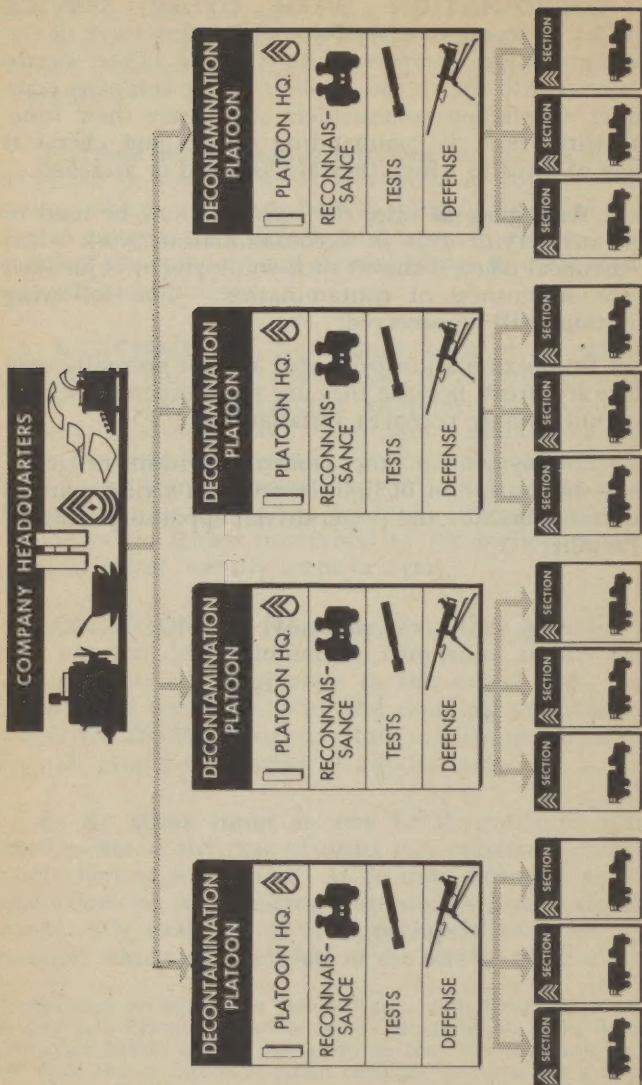


Fig. 2 Organization of decontamination company

CHAPTER 2

ORGANIZATION

6. COMPONENTS. **a. Organization** of the company is shown on the opposite page. The company consists of a headquarters, charged with all administrative details, and four decontamination platoons. Each platoon is organized and equipped to operate independently, if necessary. The section (there are three in each platoon) is the smallest group which can operate as a unit. Fifteen basics in company headquarters are detailed for special assignments as required.

b. Modification in organization of the company and platoons is undertaken to meet requirements. Operations with power-driven apparatus always require *station details* to prepare materials and *operating details* which do the actual decontamination work. Each section is led by a sergeant who takes active charge of the operating detail at all times. He is also in charge of the section's station detail, but the section corporal directs work of this detail. In operations involving an entire platoon or company, station details may work individually or be grouped together, depending on the problem. The various general situations are:

- *If the entire company is working on a single mission*, one platoon, or its equivalent in manpower, is needed as station personnel.

- *If a platoon works alone*, the full time of one sec-

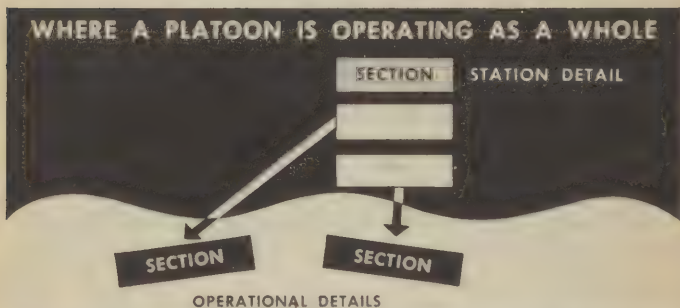


Fig. 3. Organization of units for operations with power-driven apparatus



Fig. 4. Organization of decontaminating section

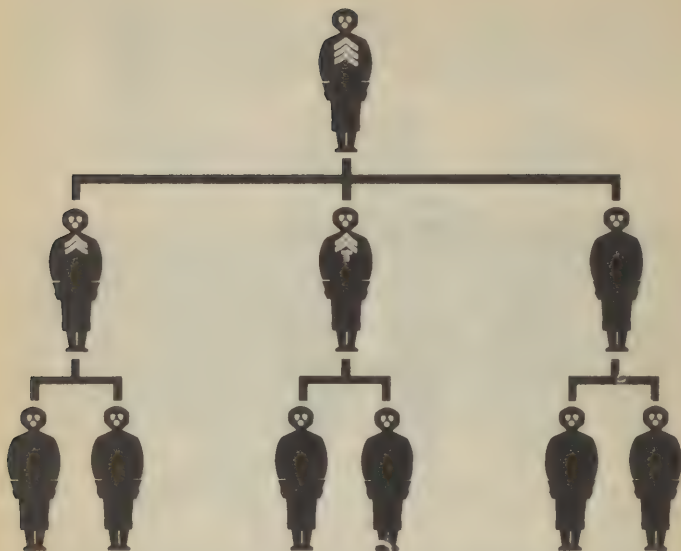


Fig. 5. Organization of the section into three details for hand decontamination

tion, or its equivalent in manpower, is needed as a station detail.

- *If a section operates alone, four to six men are needed as an operating detail for the power-driven apparatus; remaining personnel serve as a station detail.*

c. When hand decontamination methods are used, it may frequently be advisable to divide the section into three three-man details under over-all supervision of the section sergeant. One detail is directed by the section corporal, a second by a technician fifth grade, and the third by a private first class or private.

CHAPTER 3

PERSONNEL AND EQUIPMENT

7. PERSONNEL. So far as possible, men are assigned to duties on the basis of civilian qualifications. Because of the large number of vehicles, it is especially important that soldiers with mechanical skills be assigned to operation and maintenance of automotive equipment. Each section should have at least two men with sufficient mechanical aptitude and training to make minor repairs on the power-driven apparatus, and a man who can be trained to operate the pump. Understudies are trained for each mechanical job. Aside from these considerations, no special skills are required that cannot be learned quickly during training. Administrative skills required of personnel at headquarters of the chemical decontamination company are the same as those needed in any other type of unit.

8. TRANSPORTATION. The decontamination company must be able to move rapidly over considerable distances because it may be ordered to decontaminate areas or materiel in widely separated sections. Transportation has been assigned accordingly. (See T/O & E 3-217.) Vehicles provided are of the following types:

a. One-quarter-ton trucks. These are used as command cars, for messengers, reconnaissance, and for transportation of small groups of personnel.

b. Two-and-one-half-ton trucks. These are used to haul power-driven decontaminating apparatus, person-

nel, food, ammunition, clothing, decontaminating supplies, and company equipment.

c. One-ton trailers. Decontaminating materials and other supplies are carried on trailers, towed by 2½-ton trucks.

9. DECONTAMINATING EQUIPMENT. The 400-gallon power-driven apparatus is the company's principal item of decontaminating equipment. One such apparatus and a supply of 3-gallon apparatus are provided each section. Auxiliary equipment includes gasoline engine pumps, 3,000-gallon canvas water storage tanks, water heaters, and miscellaneous brushes and tools. A complete list of decontaminating equipment is given in T/O & E 3-217.

10. MISCELLANEOUS EQUIPMENT. All necessary items are provided for normal functions of supply and maintenance. All personnel are armed for individual protection with carbines or M1903 rifles. Antitank rocket launchers are provided for protection against mechanized attack and .50-caliber machine guns for anti-aircraft security. The machine guns have pedestal mounts for attachment to trucks.

CHAPTER 4

TRAINING

Section I—TRAINING OF THE INDIVIDUAL SOLDIER

11. INTRODUCTION. Training of enlisted personnel is divided into two phases. First, men go through recruit training for Chemical Warfare Service enlisted personnel. Technical instruction begins as soon as the basic phase is completed. This training includes organization of the unit into company headquarters, platoons, and sections. There follows an extended period of technical instruction of individuals and group to weld the company into a smoothly working organization.

12. BASIC TRAINING. a. Scope. Decontamination troops are service personnel and therefore do not receive extended instruction in combat tactics and techniques. Nevertheless, they must be thoroughly grounded in basic military subjects. This training becomes especially important when service troops are operating in theaters where fronts are fluid, since they may frequently be called upon to take active security measures.

b. Outline. An outline of basic training for decontamination companies is given in the appropriate mobilization training program. It includes instruction in such subjects as dismounted drill, rifle marksmanship, marches and bivouacs, field fortifications, physical conditioning, and organization and defense of rear areas. Basic train-

ing is extended into a portion of the technical training period so that personnel may make practical application of it.

Section II—TECHNICAL TRAINING PROGRAM OF THE COMPANY

13. INTRODUCTION. The objective of technical training is to enable the decontamination company to accomplish efficiently operations presented in Chapter 5. By the end of the company training program, complete proficiency must be developed in decontaminating operations and in secondary missions.

14. PROCEDURE. **a. Classification** comes first, personnel being classified according to civilian qualifications and natural aptitudes. They are then assigned, so far as possible, to jobs for which they are best suited. To provide a basis for effective instruction and efficient operations, the company is divided into platoons and sections, and the chain of command clearly defined.

b. Training comes next. Each man must master his assigned job and become familiar with general functions of his section, platoon, and company. He then learns at least one of the other jobs so that he may be prepared to perform it efficiently in the event of emergency.

c. Development of teamwork is the ultimate goal—teaching men to work together as efficient units in decontaminating operations. Therefore, individual and group training can best be accomplished by exercises with equipment as outlined in later sections of this chapter. These exercises are in effect “dry runs” of decontamination methods. They are preceded by informal inspections in which the section sergeant checks protective clothing worn by the men and assures himself

that they have the equipment necessary to carry out their decontaminating operations.

d. Training in night operations is extremely important and extensive instruction should be given.

e. Proficiency must be developed by men charged with special duties, such as headquarters personnel, mechanics, drivers, and reconnaissance personnel. This requires specialized instruction, the scope of which is presented below.

15. TRAINING OF CADRE AND OFFICERS.

Officers and noncommissioned officers of the company must be thoroughly grounded in all phases of decontaminating operations; otherwise their teaching will be unsatisfactory. It is the company commander's responsibility to inaugurate a training school as soon as the unit is activated. If possible, this instruction starts before recruits arrive. The course continues throughout the basic and technical training program. It is aimed at developing complete proficiency for all cadremen and officers in operation and maintenance of decontaminating equipment, in decontamination techniques, and in all allied subjects. Reference should be made to TM 3-220, TM 3-221, and TM 3-222.

16. TRAINING OF HEADQUARTERS PERSONNEL.

In addition to their training at cadre school, enlisted men in company headquarters receive special instruction in their duties as members of a decontamination company:

a. First sergeant, company clerk, and clerk-typist: They are instructed in decontaminating operations, since they may be called upon to replace operating personnel who become casualties. They should also become familiar with supply problems in order to assist the supply sergeant; this is particularly important for the clerk-typist, who types requisitions for the supply sergeant.



Fig. 6. Training in night operations is important!



b. Supply sergeant: In addition to his normal supply functions, he handles large quantities of decontaminating supplies and equipment. He maintains close liaison with company headquarters to make certain decontaminating supplies are available when needed. He must have a thorough knowledge of power-driven apparatus to provide replacement parts as required. He must be thoroughly versed in correct handling and storage of bleach and DANC, and in maintenance of protective clothing. The latter duty includes testing of impregnated clothing to determine when reimpregnation is necessary. Reference is made to TM 3-220, TM 3-221, TM 3-222, TM 3-290, and TM 12-250.

c. Mess sergeant and staff: They are trained in providing field-messing facilities for platoons and sections operating apart from the company on special missions.

d. Motor and pump mechanics: They are instructed in first and second echelon maintenance of all motor vehicles, and first and second echelon maintenance of 400-gallon decontaminating apparatus. Training in night operations is especially important for them. Reference is made to TM 3-221, TM 3-222, and technical manuals pertinent to maintenance of the various vehicles. Inspection procedures are outlined in these publications.

17. TRAINING OF DRIVERS. Standard driver training is given to personnel operating vehicles. They should also learn operation of the power-driven decontaminating apparatus in order that they can take over duties of other operating personnel in an emergency.

18. TRAINING IN DECONTAMINATION TECHNIQUES. **a. Practical field training,** involving realistic tactical situations, is most effective. Examples are given in Chapter 5. War gases are used. As a matter of standing operating procedure, alternate methods of decontamination are decided upon for each field problem, because alternate methods frequently have to be used in theaters of operations if standard equipment

becomes unserviceable. Night operations are stressed, since much actual decontamination is done at night.

b. Sequence of decontamination is emphasized. In any given problem this depends on such variable factors as wind direction and the tactical situation, as well as on the nature of the materiel being decontaminated; that is, wood is treated before metal, because wood absorbs blister gases. Similarly, paint absorbs blister gases; therefore, painted metal surfaces are decontaminated before unpainted surfaces.

c. Effects of decontaminating agents on various materials are taught. For example, personnel should know that DANC corrodes metals.

19. TRAINING IN USE OF DECONTAMINATING APPARATUS. Exercises in use of the 400-gallon decontaminating apparatus, as given in Section V of this chapter, provide the most effective training. This program is extensive and continuous. It includes frequent night exercises. Day and night exercises are also scheduled with the 3-gallon and 1½-quart apparatus, and in operations employing other techniques.

20. TRAINING IN MAINTENANCE OF DECONTAMINATING APPARATUS. **a. Familiarity with all four makes** of apparatus is essential for maintenance personnel. If the company is equipped with only one type, other makes are obtained temporarily for instruction. Personnel should receive training in day and night repair. Reference is made to maintenance and inspection procedures outlined in TM 3-221 and TM 3-222.

b. Maintenance of miscellaneous equipment is also covered, including cleaning of the 3-gallon and 1½-quart apparatus, and cleaning of tools.

21. TRAINING IN RECONNAISSANCE. All personnel in platoon and company headquarters are instructed in duties of a reconnaissance party as described

in Chapter 5. Training emphasis is placed on the following points:

- Use of detector equipment. (If mustard gas is detected by smell, personnel make certain it is mustard gas, not nontoxic residue left after decontamination with dry bleach or slurry.)

- Map sketching and plotting locations on maps.
- Security.
- Night reconnaissance.
- Identification of chemical agents.

22. TRAINING IN SECURITY. Gas barriers, like barbed wire barriers, are prepared to prevent our troops from entering or passing through an area; therefore, any attempt made to remove such barriers may be opposed. This emphasizes the importance of training in security. An all-around defense is set up each time the company engages in a decontamination problem, following procedures outlined in Chapter 6. Periodic air and ground attacks are simulated to test effectiveness of precautions. Finally, the company is given thorough training in use of its defense weapons: the .50-caliber machine gun, rocket launchers, carbines, and rifles.

23. TRAINING IN SAFETY PRECAUTIONS. Since the company works constantly on contaminated equipment and in contaminated areas, all personnel are trained in safety precautions until these measures become habitual. Special attention is called to:

- Proper donning, adjustment, and removal of protective clothing. (TM 3-290)

- Inspection of clothing after operations in contaminated areas. (The men check one another's clothing. If garments are found to be contaminated, wearer is sent back to the personnel decontamination station.)

- Use of protective ointment and BAL.

- Preparation of trucks to carry contaminated personnel. (Truck interiors are lined with paper, thus preventing contamination of the vehicle.)

- Immediate removal of bleach from clothing. (Otherwise, it weakens or destroys the cloth, exposing the wearer to burns if he is in a contaminated area.)

- Careful handling of contaminated tools. (After use, each piece of equipment is decontaminated and returned to the supply dump.)

- Proper methods of fighting fires. Incineration methods may often be used by the company to destroy contamination on hard-surface roads, in wrecked buildings, and on grassy terrain. Consequently, personnel should be taught how to use fire without letting it get out of hand, and how to get fires under control if they become dangerous.

- Organization and operation of a personnel decontamination station (TM 3-290). (All men operating in contaminated areas take showers, with hot water and soap if possible, immediately after removing their protective clothing. Either the 400-gallon apparatus or the 3-gallon apparatus may be used.)

- Precautions in making repairs on power-driven apparatus. (Machines must be stopped before repairs are attempted on moving parts.)

- Sanitation in the field, including preparation of latrines.

- Care in opening cans of bleach. (Since considerable pressure may have been built up in containers during storage, a hole should be punched in the lid before opening. Otherwise, the lid may fly off during removal, and injure personnel.)

Section III—DRILLS OF THE COMPANY

24. INTRODUCTION. Only two formal drills are prescribed, one without equipment and one with vehicles. Exercises in use of the power-driven apparatus, and in

miscellaneous decontaminating operations as presented in Section IV of this chapter, are not considered drills since they do not lend themselves to precision work.

25. DRILL WITHOUT EQUIPMENT. All basic movements such as facings, salutes, steps, and marching, are performed as prescribed for infantry in FM 22-5. For drill purposes, each section represents a squad, with three sections to the platoon. A fifth platoon may be formed with company headquarters personnel, including the 15 basics, this platoon constituting three 11-man squads. Normally a fifth platoon is not used in parade formations, since headquarters personnel are usually assigned to duties which preclude their participation.

26. DRILL WITH VEHICLES. In drills or formations each platoon is headed by its $\frac{1}{4}$ -ton truck. This is followed by the power-driven decontaminating apparatus mounted on trucks, each truck pulling a trailer, and finally the $2\frac{1}{2}$ -ton service truck with trailer. The column of platoons is headed by company headquarters vehicles.

Section IV—EXERCISES WITH MISCELLANEOUS EQUIPMENT

27. INTRODUCTION. These exercises are intended solely for instruction, to acquaint personnel with their duties in field operations. Although the "by the numbers" system is used, no attempt is made to conduct exercises as precision drills except in preliminary formations. It is highly important that each member of an operating detail be trained *in all positions*; that is, No. 1, No. 2, No. 3, etc. Exercises are given below for three-man details using hand methods of decontamination. As pointed out in Chapter 2, the section may be divided into three such details for hand methods. This is the same division normally used in second echelon decontamination.

28. FORMATION OF THREE-MAN DETAILS. Sections may be formed in line or in line of details, as shown in figure 7, wearing permeable protective clothing.

a. To form in line, the section leader commands: FALL IN. He then commands: 1. BY DETAILS, 2. COUNT OFF. Details then count off consecutively, one, two, three; one, two, three, etc.

b. To form in line of details, the commands are: 1. BY DETAILS IN COLUMN, 2. FALL IN. To organize the section, the section leader then commands: 1. BY DETAILS, 2. COUNT OFF. Each detail counts off consecutively from front to rear.

29. DRILL FOR INSPECTION OF CLOTHING WITH THREE-MAN DETAILS. While in the field, inspection of protective clothing should be habitual. To develop this habit, sections formed in three-man details are given the command: 1. INSPECT, 2. CLOTHING, immediately after falling in and counting off. When formed in line, inspection proceeds from right to left, each man making a thorough inspection of the man at his left. The sergeant and No. 1 of the first detail inspect each other, as do Nos. 2 and 3 of the last detail in line. When formed in line of details, No. 1 is inspected by No. 2, No. 2 by No. 3, and No. 3 by No. 2. The sergeant is inspected by No. 1 of the first detail. Examination of clothing should be thorough. Particular attention is given to close fitting of garments. Hoods must fit snugly over gas masks, and be buttoned securely; gloves are examined to make certain they are well up over the wrists and fit tightly; trousers must be completely encased inside the leggings; all buttons must be fastened. Finally, all portions of the clothing surface (with particular attention to crotch and armpits) are examined for tears. To test the efficiency of personnel making the inspection, instructors should have certain personnel disarrange their clothing intentionally before the drill is conducted.

FORMATION OF THREE-SQUAD SECTION IN LINE



SECTION LEADER

SQUAD LEADERS

FORMATION OF THREE-SQUAD SECTION IN LINE OF DETAILS

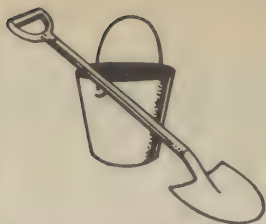


SQUAD LEADERS

SECTION LEADER



Fig. 7. Formation of section for hand decontamination exercises



30. EXERCISE OF THREE-MAN DETAIL WITH DRY MIX OR DRY BLEACH.

a. The command is: 1. FOR DRY MIX (FOR BLEACH), 2. PROCURE EQUIPMENT. All details then fall out and procure the following:

No. 1—Long-handled, round-pointed shovel if using dry mix. Short-handled shovel and 14-quart bucket if using dry bleach.

No. 2—Short-handled shovel and 14-quart bucket.

No. 3—Equipment as needed: broom, rake, ax, pick mattock, or brush hooks.

b. Inspection. Each man comes to attention automatically when the section leader passes in front of him. The section leader inspects both equipment and clothing.

c. Assignment. The section leader then assigns a definite task to each detail, pointing out wind direction, location of supply station, and other pertinent facts. He then commands: ACTION, and each No. 1 leads his detail to the assigned area.

d. Dry mix. If dry mix is being used, No. 1 marks the area and, with No. 2, carries bleach and mixes it with dirt. No. 3 stirs the mixture, cuts brush, and performs other tasks appropriate to the tools being carried.

e. Dry bleach. If dry bleach is being used, No. 1 marks the area, both Nos. 1 and 2 carry bleach to the area in their buckets and dump it, and No. 3 spreads it as necessary.



Fig. 8. Three-man detail in dry bleach exercise

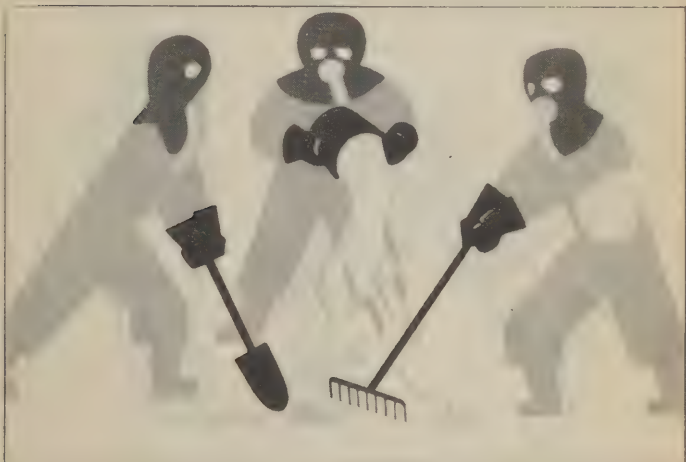
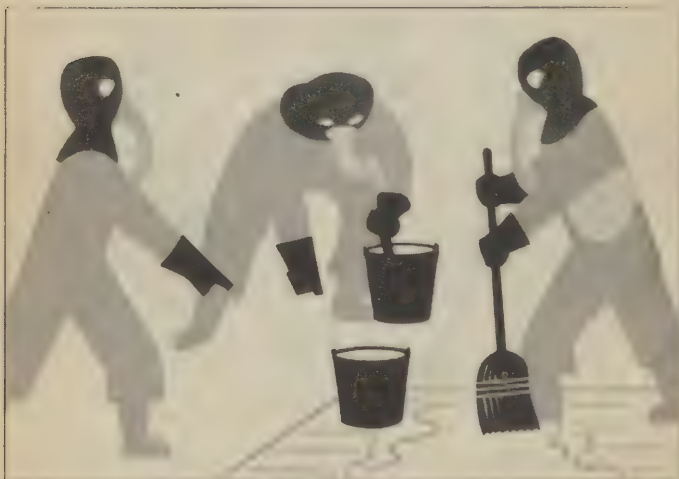




Fig. 9. Three-man detail in slurry exercise





31. EXERCISE OF THREE-MAN DETAIL USING SLURRY. **a. Commands.** Starting from either of the detail formations, the command is: 1. FOR SLURRY, 2. PROCURE EQUIPMENT. All details then fall out and procure the following:

No. 1—Short-handled shovel, 14-quart bucket, mixing funnel, and paddle.

No. 2—Same as *No. 1*.

No. 3—Two brooms or two brushes, and two swabs.

b. Inspection. Each man comes to attention automatically when the section leader passes in front of him. The section leader then assigns a definite task to each detail and commands: ACTION. Each *No. 1* then leads his detail to the assigned area.

c. Operations. *No. 1* supervises the job and either mixes slurry in his bucket or helps scrub it into the contaminated surface, depending upon where his assistance is required. *No. 2* mixes slurry. *No. 3* applies it.

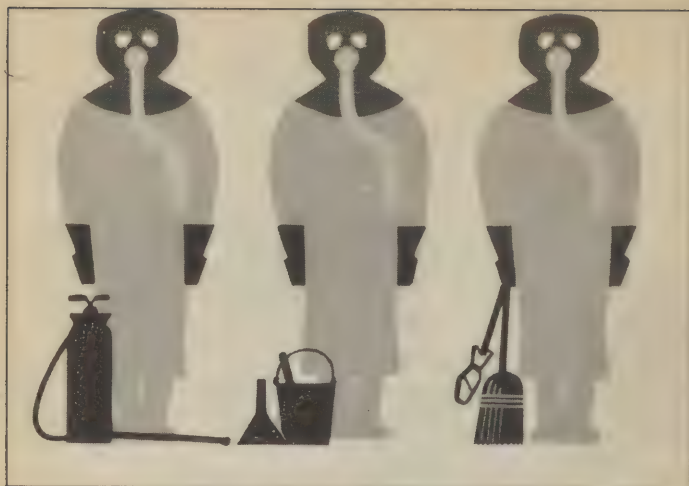


Fig. 10. Three-man detail in DANC exercise





32. EXERCISE OF THREE-MAN DETAIL USING DANC. **a. Commands.** Starting from either of the detail formations, the command is: 1. FOR DANC, 2. PROCURE EQUIPMENT. All details then fall out and procure the following:

No. 1—Three-gallon decontaminating apparatus.

No. 2—Bucket, paddle, and funnel.

No. 3—Broom and swab.

b. Execution. Inspection routine is the same as in previous exercises; at its termination, the section leader designates missions and commands: ACTION to each detail in turn. During operations, No. 1 operates the 3-gallon apparatus, No. 3 works the DANC into contaminated surfaces, and No. 2 prepares DANC.

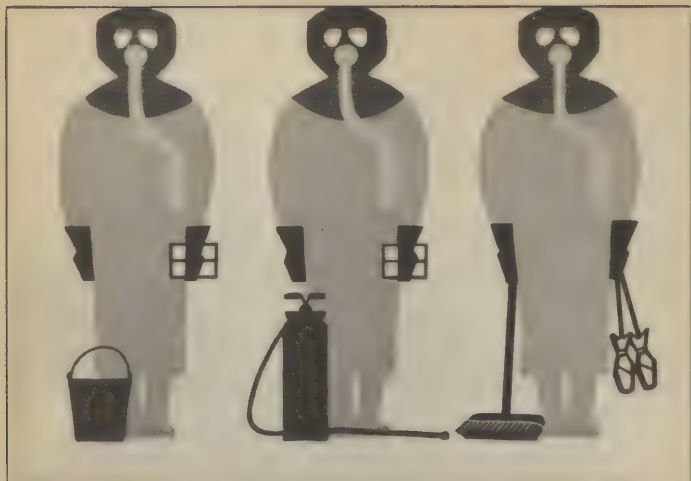


Fig. 11. Three-man detail in hot water exercise





33. EXERCISE OF THREE-MAN DETAIL USING HOT WATER. **a. Preliminary.** Before this exercise, the participating section or another group is designated to establish a supply of hot water. Starting from either of the detail formations, the command is: 1. FOR HOT WATER, 2. PROCURE EQUIPMENT. All details then fall out and procure equipment:

Nos. 1 and 2—Each gets one 14-quart bucket or 3-gallon decontaminating apparatus, and 2 bars of G.I. soap.

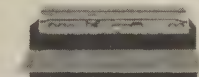
No. 3—Long-handled brush and two swabs.

b. Operations. After inspection, assignment of missions, and the command, ACTION, each detail moves out to the source of hot water. No. 1 directs operations and uses either a brush or a water container as required by the situation. No. 2 applies hot soapy water. No. 3 replenishes the mixture as buckets are emptied.

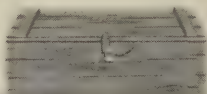
EQUIPMENT NECESSARY FOR SLURRY AND HOT WATER OPERATION WITH POWER DRIVEN APPARATUS



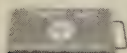
10 OUTFITS PROTECTIVE CLOTHING



SET OF TOOLS FOR PUMP



REPLACEMENT PARTS FOR POWER DRIVEN APPARATUS



FIRST AID KIT



POWER DRIVEN APPARATUS

PLUS
FOR HOT
WATER

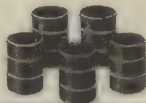


MEASURING STICK



FUEL

PLUS
FOR
SLURRY



DRY BLEACH, 1300 POUNDS



WATER HEATER



AXE OR HATCHET SHOVEL CROW BAR



DETERGENT



HAND BARROWS

Fig. 12.

34. ROUTINE AFTER EXERCISES. As each detail completes its mission, the detail leader reports to the section leader who inspects and checks for completeness of decontamination. He then directs the detail leader to have equipment cleaned. After each man has cleaned his equipment, the detail forms for inspection by the section leader. Equipment is then returned to the source of supply, and personnel remove protective clothing. Standard undressing procedures are followed.

Section V—EXERCISES WITH POWER-DRIVEN EQUIPMENT

35. INTRODUCTION. During training, at least in preliminary stages, work with power-driven apparatus is conducted on an informal drill basis to acquaint personnel with their duties. Trainees change position frequently during these exercises so that each man becomes acquainted with all phases of operations. Exercises are modified as necessary to conform to the various makes of apparatus. (See TM 3-221 and TM 3-222.) Positions and duties outlined below are intended only as a general guide.

36. INSPECTION. No individual display of equipment is specified, but, before each training mission, every member of the section makes certain that equipment he needs has been stowed away on the truck or trailer. The section leader then makes an informal inspection to ascertain that necessary equipment is available as shown in figure 12.

37. CHARGING WITH WATER (M3A1 OR M3A2 APPARATUS). **a. Preparation.** Before moving into position for the charging operation, the four-man detail is formed in line. The section sergeant commands:

1. CHARGE WATER, 2. POSTS. Detail members then take the following positions:

No. 1 (leader) by pump valves.

No. 2 in driver's seat.

No. 3 on right platform by loading manhole.

No. 4 on left platform by loading manhole.

b. Execution. Detail members then perform the following duties:

No. 1 operates pump and directs operations.

No. 2 operates truck engine, engaging and disengaging power take-off clutch.

No. 3 dismounts and places water intake hose into source of water.

No. 4 removes manhole cover, raises strainers, and checks volume of water in tank.

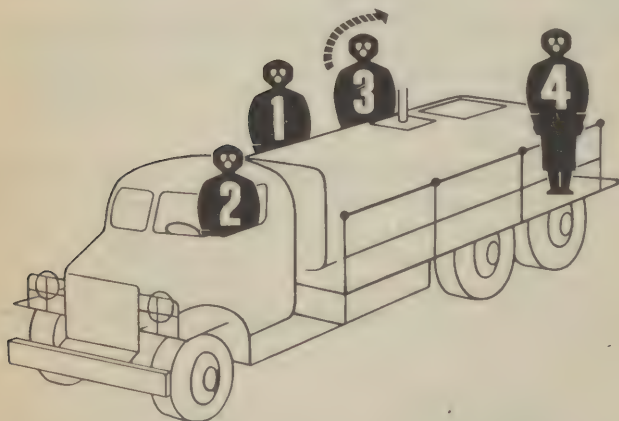


Fig. 13. Positions for charging M3A1 or M3A2 apparatus with water

38. CHARGING WITH WATER (M4 APPARATUS). **a. Preparation.** Following preliminary inspection and the command: 1. CHARGE WATER, 2. POSTS, operating detail members take the following positions:

No. 1 (leader) beside pump valves.

No. 2 opposite pump connection for water intake hose.

No. 3 on ground at rear of truck.

No. 4 at right side of loading manhole.

b. Execution. Detail members then perform the following duties:

No. 1 operates engine, pump valves, and pump clutch, and directs operations.

No. 2 handles water intake hose, fastening it to pump connection.

No. 3 pulls water intake hose off truck, passes coupl-

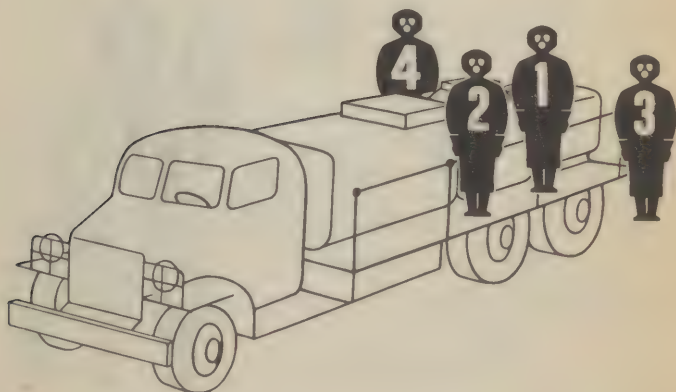


Fig. 14. Positions for charging M4 apparatus with water

ing end to No. 2, then places screened end into source of water.

No. 4 helps handle water intake hose, removes man-hole cover, raises strainers, and checks volume of water in tanks.

39. LOADING BLEACH BY DIRECT METHOD (M3A1 OR M3A2 APPARATUS). The entire 10-man section is used in all exercises in which bleach is loaded into the 400-gallon apparatus, both by direct and hand barrow methods.

a. Preparation. After formation and inspection, the leader commands: 1. DIRECT METHOD, 2. POSTS. Section members then take the following positions:

No. 1 (leader) on platform by pump valves.

No. 2 in driver's seat.

Nos. 3 and 4 at rear end of left platform.

No. 5 at rear end of right platform.

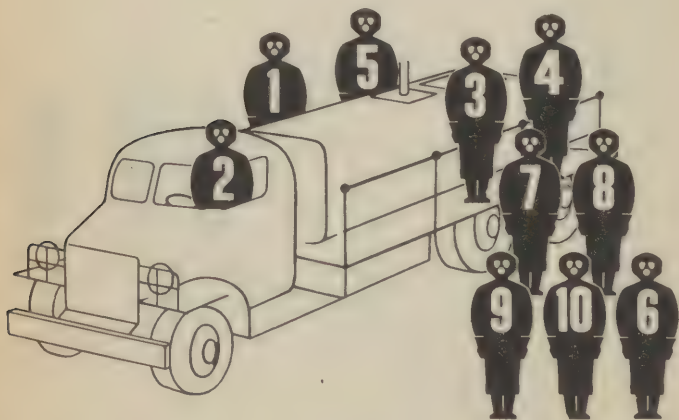


Fig. 15. Positions for loading M3A1 or M3A2 apparatus with bleach (direct method)

Nos. 6 (assistant leader), 7, 8, 9, and 10 on ground at left side.

b. Execution. Section members then perform the following duties:

No. 1 operates pump and directs operations.

No. 2 operates truck engine, engaging power take-off clutch.

No. 3 removes manhole cover, raises strainers, tips cans into hopper, and charges bleach (assisted by No. 4).

No. 4 helps No. 3 dump bleach into hopper.

No. 5 beats cans with tool as bleach is poured, takes empty cans from Nos. 3 and 4, and drops them to ground.

No. 6 directs station detail preparing bleach cans, and assists where needed.

Nos. 7 and 8 lift opened cans of bleach to left platform of truck.

No. 9 opens cans of bleach.

No. 10 rolls cans of bleach from supply dump to truck.

40. LOADING BLEACH BY DIRECT METHOD (M4 APPARATUS). **a. Preparation.** After formation and inspection of the complete section, the section leader commands: 1. DIRECT METHOD, 2. POSTS. Section members then take the following positions:

No. 1 (leader) on truck by engine.

Nos. 2 and 3 on right side of apparatus, by loading manhole.

No. 4 on left side, by loading manhole.

Nos. 5 (assistant leader), 6, 7, 8, 9, and 10 on ground at right of apparatus.

b. Execution. Section members perform the following duties:

No. 1 operates engine and directs operations.

No. 2 raises strainers, removes manhole cover, and holds bleach cans over loading manhole (assisted by *No. 3*). After bleach has been added, he replaces manhole cover.

No. 3 helps *No. 2* hold cans over manhole.

No. 4 beats containers with tool as *Nos. 2* and *3* hold them over manhole, takes empty cans from *Nos. 2* and *3*, and drops them to ground.

No. 5 directs station detail preparing bleach cans on ground, and assists where needed.

Nos. 6 and 7 pass opened cans of bleach to *Nos. 2* and *3*.

No. 8 opens bleach cans.

No. 9 rolls cans of bleach from dump to truck.

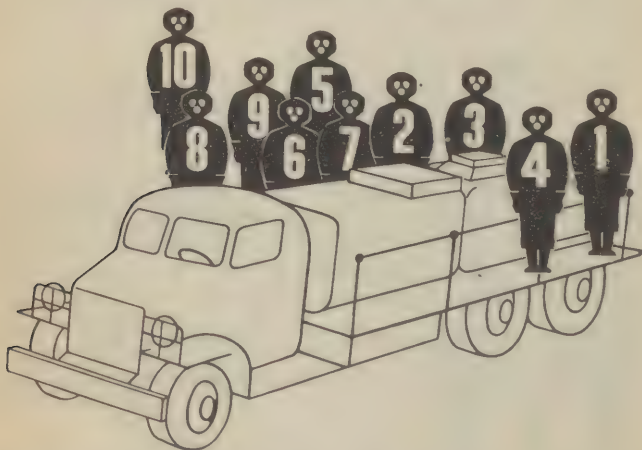


Fig. 16. Positions for loading M4 apparatus with bleach (direct method)

No. 10 helps roll cans from dump to truck and helps open cans, as needed.

41. LOADING BLEACH BY HAND BARROW METHOD (M3A1 OR M3A2 APPARATUS). a.

Preparation. After formation and inspection of the complete section, the sergeant commands: 1. HAND BARROW METHOD, 2. POSTS. Section members then take the following positions:

No. 1 (leader) by pump valves.

No. 2 in driver's seat.

Nos. 3 and 4 at rear of left platform.

Nos. 5 (assistant leader), 6, 7, 8, 9, and 10 on ground at left of apparatus.

b. Execution. Section members perform the following duties:

No. 1 operates pump and directs operations.

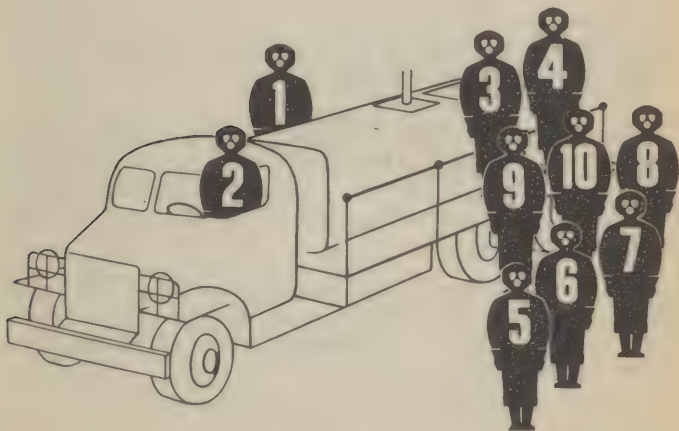


Fig. 17. Positions for loading M3A1 or M3A2 apparatus with bleach (hand barrow method)

No. 2 operates engine and power take-off.

No. 3 removes manhole cover, raises strainers, places hopper on manhole, and dumps bleach into tank (assisted by *No. 4*).

No. 4 helps *No. 3* dump bleach into tank. After loading, he removes hopper and replaces manhole cover.

No. 5 directs station detail, rolls bleach cans from dump, and removes tops from cans.

Nos. 6 and 7 loosen bleach in cans and dump contents into hand barrows.

No. 8 breaks up bleach in hand barrow.

Nos. 9 and 10 hand filled barrows to *Nos. 3 and 4*.

42. LOADING BLEACH BY HAND BARROW METHOD (M4 APPARATUS). Except for *Nos. 1 and 2*, all positions with respect to the M4 apparatus and all functions are the same as for filling the M3A1 or M3A2 by the hand barrow method. (Par. 41) When loading the M4 apparatus, *No. 1* operates the engine and supervises work. *No. 2* takes a position on the ground at right of apparatus and helps prepare bleach.

43. LOADING HOT WATER AND DETERGENT (M3A1 OR M3A2 APPARATUS). Seven men are needed for this procedure. Personnel may be taken partly from the operating detail and partly from the station detail.

a. Preparation. After preliminary formation and inspection, the sergeant commands: 1. HOT WATER METHOD, 2. POSTS. Section members then take the following positions:

No. 1 (leader) by pump valves.

No. 2 in driver's seat.

No. 3 on rear right platform.

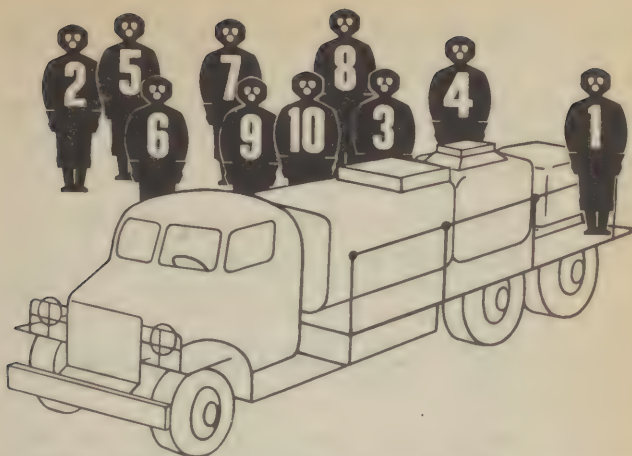


Fig. 18. Positions for loading M4 apparatus with bleach (hand barrow method)

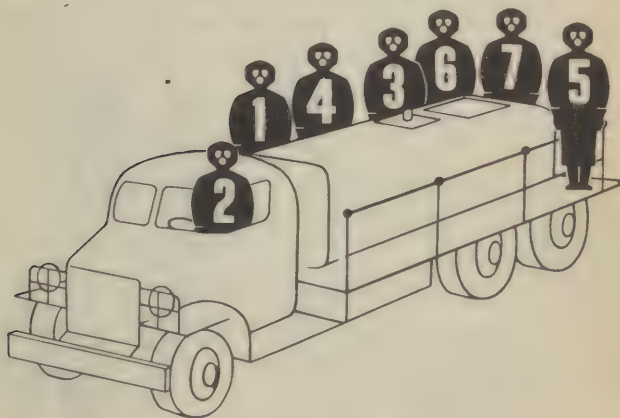


Fig. 19. Positions for loading M3A1 or M3A2 apparatus with hot water and detergent

No. 4 on ground at right of apparatus.

No. 5 on rear left platform.

Nos. 6 and 7 on ground by water heater.

b. Execution. Section members perform the following duties:

No. 1 operates pump and supervises work.

No. 2 operates engine and power take-off.

No. 3 removes manhole cover, connects heating unit inlet hose and water intake hose, and places heater outlet hose into manhole. He watches pressure gage and water level during loading and replaces water intake hose after tank is filled.

No. 4 places end of water intake hose in water, hands end of heating unit outlet hose to *No. 3*, and replaces heating unit outlet hose after tank is filled.

No. 5 adds detergent and replaces manhole cover.

Nos. 6 and 7 operate water heater.

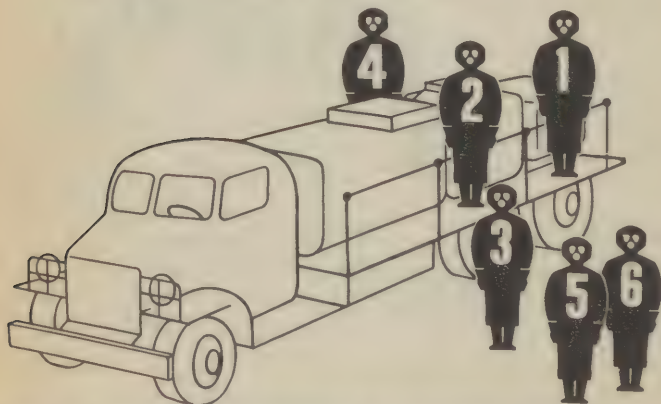


Fig. 20. Positions for loading M4 apparatus with hot water and detergent

44. LOADING HOT WATER AND DETERGENT (M4 APPARATUS). With the exception that only six men are required, all positions with respect to the M4 apparatus and all functions are the same as for loading the M3A1 and M3A2 with hot water and detergent, as described in paragraph 43. When loading the M4 apparatus with hot water and detergent, No. 1 operates the engine and directs operations. No. 2 has no functions; the number designations of men from Nos. 3 to 7, inclusive, given in paragraph 43, may therefore be lowered one digit.

45. SPRAYING WATER (M3A1 OR M3A2 APPARATUS). The apparatus is used in this instance to spray water directly from the source, without loading into tank. The sergeant and five men comprise the operating detail.

a. Preparation. After preliminary formation and inspection, the sergeant commands: 1. DIRECT SPRAY, 2. POSTS. At this command, crew members take the following positions:

No. 1 (leader) on right platform.

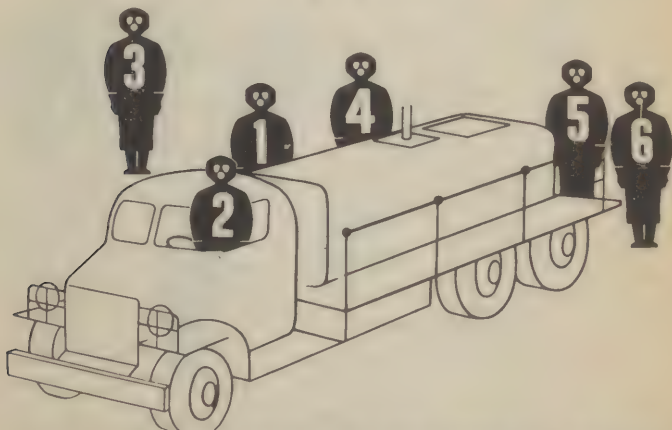


Fig. 21. Positions for spraying water from M3A1 or M3A2

No. 2 in driver's seat.

No. 3 on ground at strainer end of water intake hose.

No. 4 on right side of apparatus.

Nos. 5 and 6 on ground at rear of truck.

b. Execution. Crew members perform the following duties:

No. 1 operates pump valves and directs operations.

No. 2 operates engine.

No. 3 places strainer end of intake hose in source of water.

No. 4 handles water intake hose.

Nos. 5 and 6 operate spray nozzles.

46. SPRAYING WATER (M4 APPARATUS). The sergeant and four men comprise the operating detail.

a. Preparation. After formation and inspection, the

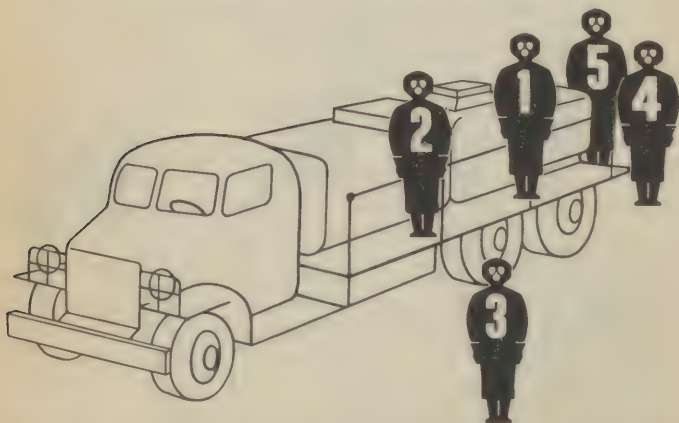


Fig. 22. Positions for spraying water direct from source with M4 apparatus

sergeant commands: 1. DIRECT SPRAY, 2. POSTS. At this command, crew members take the following positions:

No. 1 (leader) beside pump valves.

No. 2 at water intake hose connection.

No. 3 on ground at source end of water intake hose.

b. Execution. Crew members perform the following duties:

No. 1 operates engine, pump valves, and pump clutch, and directs operations.

No. 2 handles water intake hose on the truck, and connects it to the pump.

No. 3 places water intake hose in source of water.

Nos. 4 and 5 operate spray nozzles.

47. SPRAYING SLURRY (M3A1 OR M3A2 APPARATUS). A four-man operating detail is required, including the section leader.

a. Preparation. After formation and inspection,

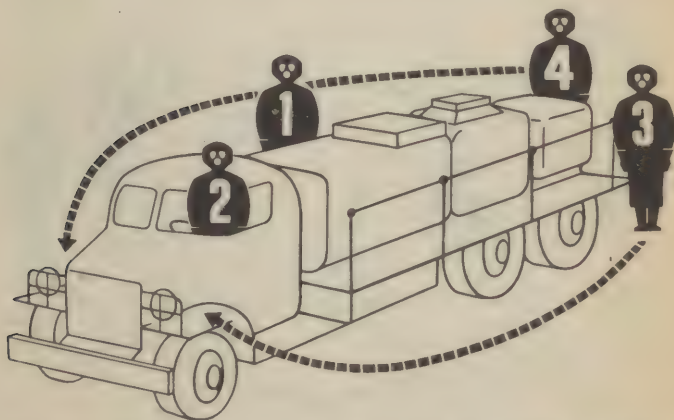


Fig. 23. Positions for spraying slurry from M3A1 or M3A2 apparatus

the sergeant commands: 1. SPRAY SLURRY, 2. POSTS. Members of the detail then take the following positions:

No. 1 (leader) on platform by pump valves.

No. 2 in driver's seat.

No. 3 at rear of truck, then on left front fender (or where needed).

No. 4 at rear of truck, then on right front fender.

b. Execution. Detail members perform the following duties:

No. 1 operates pump and directs operations.

No. 2 drives truck.

Nos. 3 and 4 unwind hoses at rear of truck, then move to front fenders and operate spray guns.

48. SPRAYING SLURRY (M4 APPARATUS). A four-man operating detail is required, including the sergeant. After formation and inspection, the sergeant commands: 1. SPRAY SLURRY, 2. POSTS. Members of the detail then take positions with respect to the M4 appara-

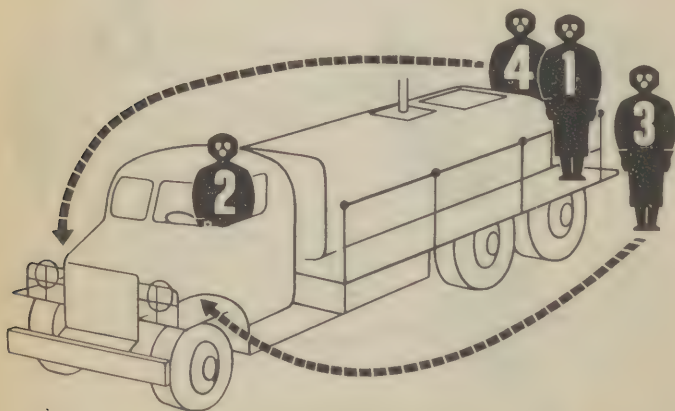


Fig. 24. Positions for spraying slurry from M4 apparatus

tus comparable to positions for spraying slurry with the M3A1 and M3A2 apparatus, as outlined in paragraph 47. Functions are also the same, except that No. 1 operates the engine and pump.

49. SPRAYING HOT WATER (M3A1 OR M3A2 APPARATUS). Five men and the sergeant are required.

a. Preparation. After formation and inspection, the sergeant commands: 1. SPRAY HOT WATER, 2. POSTS. Crew members then take the following positions:

No. 1 (leader) by pump valves.

No. 2 in driver's seat.

Nos. 3, 4, 5, and 6 on ground at rear of truck.

b. Execution. Members perform following duties:

No. 1 operates pump valves and directs operations.

No. 2 operates engine and power take-off.

Nos. 3 and 4 operate nozzles.

Nos. 5 and 6 scrub surface with brushes.

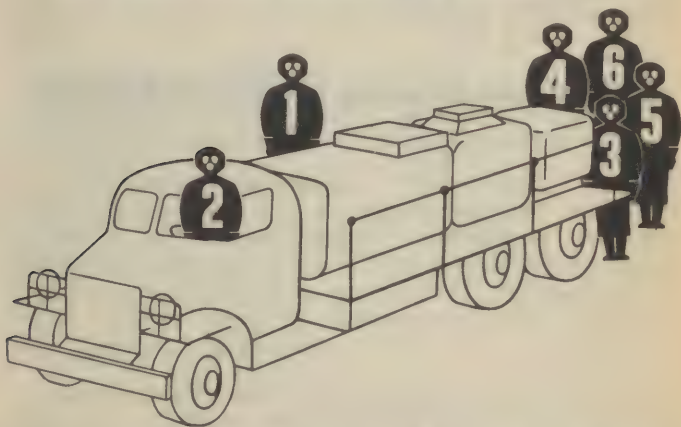


Fig. 25. Positions for spraying hot water from M3A1 or M3A2 apparatus

50. SPRAYING HOT WATER (M4 APPARATUS).

Five men and the sergeant are required. After preliminary formation and inspection, the sergeant commands: 1. SPRAY HOT WATER, 2. POSTS. All positions with respect to the apparatus and all functions are the same as with the M3A1 and M3A2 (par. 49) except that No. 2 is not needed until the truck moves, and No. 1 (leader) operates the engine as well as the pump.

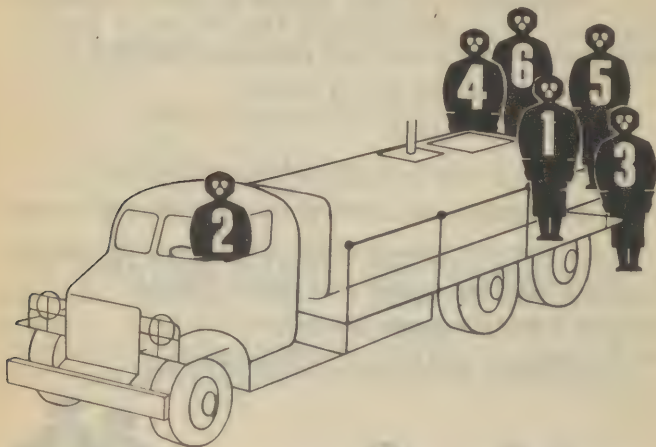


Fig. 26. Positions for spraying hot water from M4 apparatus

CHAPTER 5

OPERATIONS

Section I—GENERAL FACTORS

51. MOBILITY. a. General. Each company may be responsible for operations over a large area. Moreover, the company may at any time be divided into two or more units to perform decontaminating operations in relatively widely separated areas. It must therefore be highly mobile. Transportation must be allocated and the supply system arranged so the company can perform its duties either as a single unit or divided into several units, and still be able to move to other areas on short notice.

b. Packing. Since no excess transportation is provided, supplies and equipment must always be packed in trucks and trailers, with attention to economy of space.

c. Allotment of vehicles. When only one or two platoons of a company are operating, and when no operations are contemplated immediately for the remainder of the company, it is often possible to attach supply trucks from other platoons to operating units. These vehicles must be returned to their respective platoons as soon as possible.

d. Extra vehicles. In some situations it may be necessary to request additional vehicles from the supported unit, if organizational transportation of the company is inadequate. To minimize transportation diffi-



1. HIGH GROUND
2. FAVORABLE POSITION IN COMMUNICATIONS NET
3. CONCEALMENT
4. GOOD WATER SUPPLY
5. PROXIMITY TO CHEMICAL DEPOT (Not essential if communications are good)
6. CENTRALLY LOCATED
○ AMONG INSTALLATIONS IT SERVES

Fig. 27. Selection of company site

culties and facilitate efficient operation, the company selects its base location carefully. Figure 27 shows important factors in selecting an immediate site, while figure 28 schematically shows suggested locations for the company with respect to its responsibilities in the service area.

52. TIME FACTORS. Time required for any given operation depends on nature and extent of contamination, distance supplies must be hauled, method of decontamination determined, and ability of personnel. Although these variables make it impossible to establish definite time factors, certain average factors can be given. These are shown in figures 29, 30, and 31.

53. AREA SERVED BY A COMPANY. a. General. The area which a company can serve adequately varies with the situation. As a rule of thumb, however, it may be assumed that if all units operate from a common base, the four platoons can work effectively up to 5 miles from their service and supply depot.

b. In stable situations. In fairly stable situations, the company commander may divide the area for which he is responsible into a "fire department plan" of defense, consisting of well-defined sectors, one sector covered by a platoon. Such platoons are separated from the company. Under these circumstances, the number of sectors usually is not more than three. The fourth platoon is retained at company headquarters where its personnel and vehicles are needed for service functions such as supply of food and decontaminating materials. The three extra 400-gallon apparatus are then available as emergency replacements in case apparatus of the three operating platoons break down. Moreover, the company will have reserve equipment which can be rushed to any sector. A typical layout showing division of the company area into such sectors is shown in figure 32.

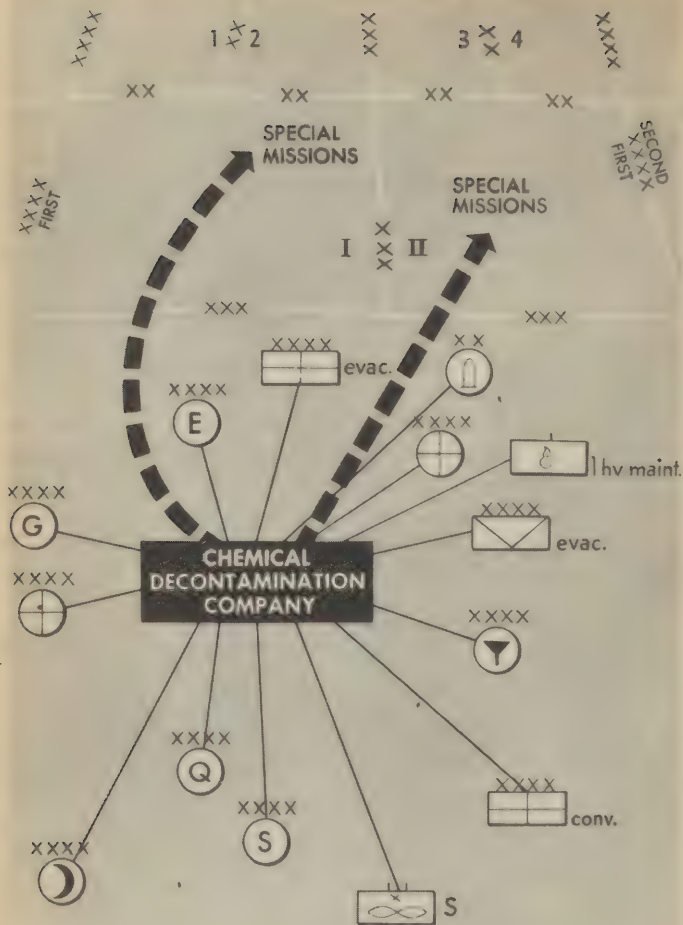


Fig. 28. Location of company in service area

Section II—FUNCTIONS OF VARIOUS UNITS

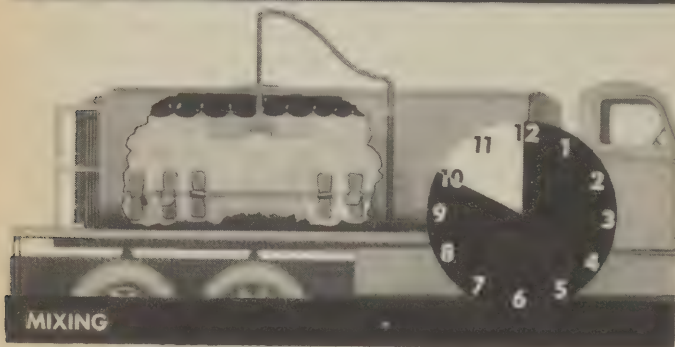
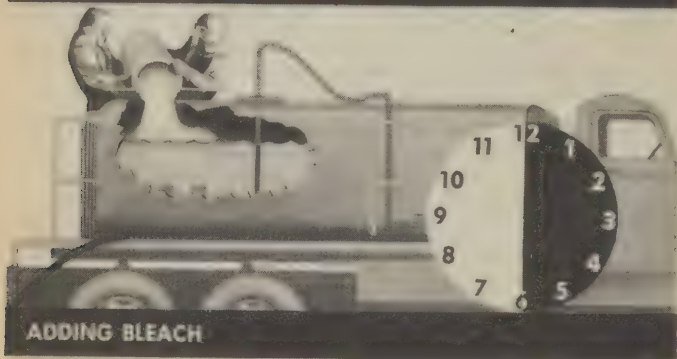
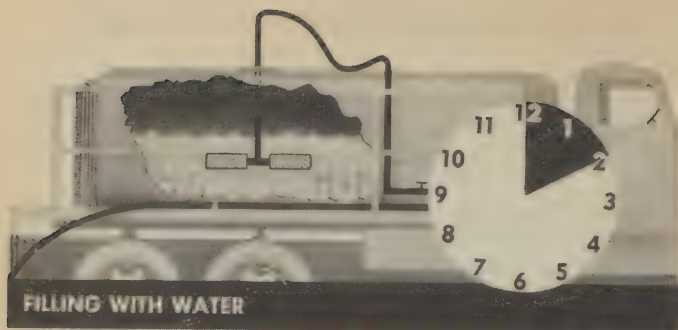
54. INTRODUCTION. Prompt and efficient completion of a mission depends on well-defined channels of command and clear allocation of responsibility. Functions of each unit from company headquarters down to the section are controlled by standing operating procedures, but these procedures must be sufficiently flexible to stand up under emergency conditions.

55. FUNCTIONS OF COMPANY HEADQUARTERS. **a. Coordination.** The company commander, assisted by his first sergeant, coordinates operations of units in his company. This supervision implies that proper decontamination methods are used, that work is divided so that each unit works most effectively, and that decontaminating supplies are delivered on time at the right place.

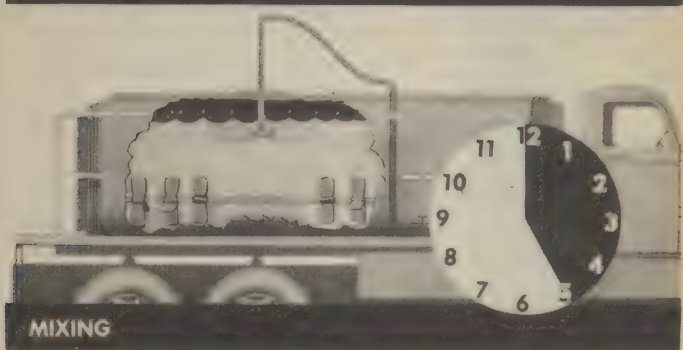
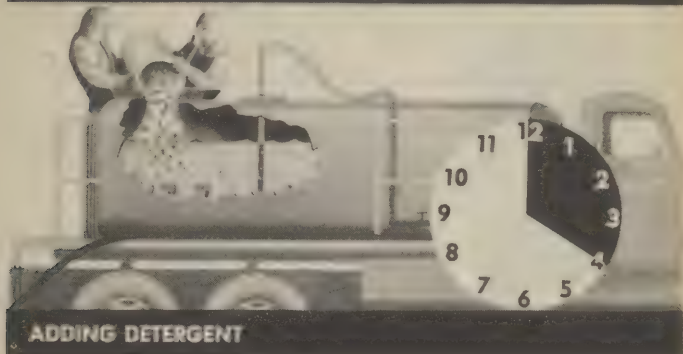
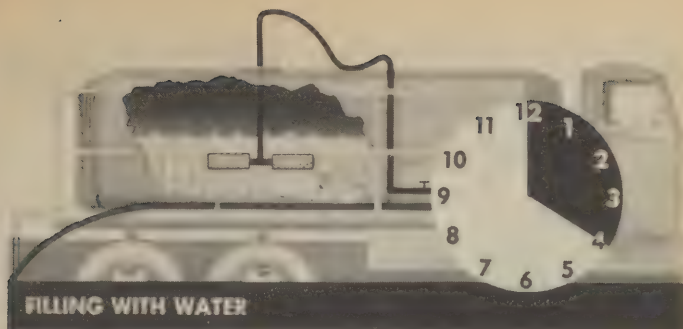
b. Supervision. It is always the company commander's responsibility to determine what units are needed for an assigned mission. Therefore, he supervises every preliminary reconnaissance personally, accompanied by his platoon leaders. Each platoon leader makes a further reconnaissance of the contamination situation assigned to his platoon, reporting back to the company commander. The company commander then coordinates the mission, making all necessary provisions for supply, establishment of supply dumps, messing facilities, etc.

c. Duties. Other personnel of company headquarters have well-defined responsibilities during operations:

(1) **The supply dump** is established by the supply sergeant as near the site of operations as possible; although, in cases where platoons are dispersed widely, it may be more feasible to retain the main dump at the company's base. The supply sergeant procures decontaminating materials and other supplies on the basis of estimated requirements. Each platoon sends back to the main dump for materials as needed. Advance dumps



**Fig. 29. Time factors in power-driven apparatus with slurry
(Total elapsed time, 50 minutes)**



**Fig. 30. Time factors in charging power-driven apparatus with hot water and detergent (using two water heaters)
(Total elapsed time, 25 minutes)**


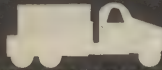




TYPE OF EQUIPMENT	FILLING AND MIXING TIME	DISCHARGE TIME	COVERAGE IN SQ. YARDS
 POWER DRIVEN APPARATUS WITH SLURRY	50 MINUTES SLIGHTLY LESS FOR M4 APPARATUS	25 MINUTES	1300 SQ. YARDS AREA
 POWER DRIVEN APPARATUS WITH HOT WATER	25 MINUTES (USING 2 WATER HEATERS)	20 MINUTES	100 SQ. YARDS (METAL EQUIPMENT)
 EARTH BLEACH MIXTURE			50 SQ. YARDS PER HOUR PER MAN (AREA)
 DRY BLEACH			100 SQ. YARDS PER MAN PER HOUR (AREA)
 M1 APPARATUS (3 GAL.) WITH DANC	10 MINUTES	10 MINUTES	45 TO 90 SQ. YARDS (METAL EQUIPMENT)
 M2 APPARATUS (1 1/2 QUART) WITH DANC	10 MINUTES	10 MINUTES	12 SQ. YARDS (METAL EQUIPMENT)

Fig. 31. Time and area factors for decontamination, using various types of equipment and materials. Coverage is variable, depending on type of surface and other factors; therefore, the figures given here should be considered average

may also be established for sections operating some distance from platoon headquarters.

(2) **The personnel decontamination station** is a responsibility of company headquarters if the entire company is operating on a single mission. Otherwise, each platoon establishes its own. Men required to set up and operate the station are supplied from operating personnel. When an entire company is operating, a section is usually required for this purpose, or necessary personnel are taken from among the 15 basics in company headquarters.

(3) **Field messing** is the responsibility of company headquarters whether the entire company or only a smaller unit is operating; but a platoon or section operating some distance from the company base may be attached to another organization for rations.

(4) **Motor maintenance** personnel of company headquarters remain at the company base unless needed elsewhere.

56. FUNCTIONS OF PLATOON HEADQUARTERS.

The platoon leader, assisted by his platoon sergeant, commands the platoon and sees that orders of the company commander are carried out.

a. Reconnaissance function. The company commander's reconnaissance being only preliminary, platoon leaders and their parties are responsible for thorough reconnaissance of the area assigned to the platoon for decontamination, and for gathering complete data on the mission. These duties are illustrated in figures 35 and 36.

b. Operational function. Neutralization or removal of war gases from areas, materiel, or installations, as assigned by higher command, is the platoon's operational function. The platoon usually works as a separate unit, provides its own security against enemy action, and main-

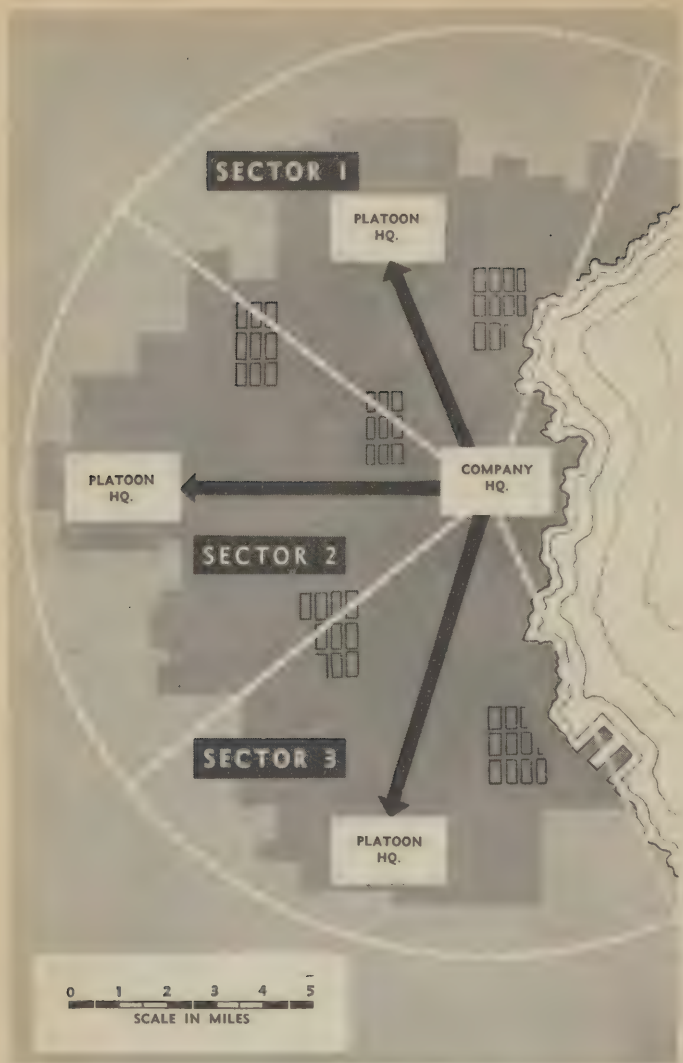


Fig. 32. Division of company area into sectors. One platoon remains at company headquarters

tains its own communications with company headquarters. Platoon operations are described in Section III, below.

57. PROCEDURE FOLLOWING DECONTAMINATION. Since completeness of decontamination is the company commander's responsibility, he supervises tests whenever feasible. Platoon leaders always make their own tests and report to the company commander.

58. COMMUNICATIONS. Company headquarters is furnished telephone connection to the army telephone system. Company headquarters is not normally connected with platoons by telephone, however, but depends upon messengers for such communication. Platoons likewise depend upon messengers for communication with company headquarters and with other platoons.

Section III—TACTICAL APPLICATION OF DECONTAMINATION TECHNIQUES

59. INTRODUCTION. This section is concerned only with the tactical application of techniques. Full information on techniques is given in TM 3-220. Selection of techniques is based on results of the gas reconnaissance described in Section II. Frequently the technique best suited to the problem cannot be used because the tactical situation interferes, or because necessary equipment is not available. Extreme flexibility and resourcefulness are therefore necessary. Commanders should keep constantly in mind that their primary mission is not *complete* removal of *all* contamination, but only the removal of that contamination which interferes with functions of friendly troops. Speed is essential; operations are completed as quickly as possible so that decontamination troops can be made available for

another mission. The technique selected should also make the least possible physical demands on personnel; there is no justification for employing an involved and difficult technique when labor- and time-saving methods suffice.

60. AREAS. a. General. When large areas are contaminated, it is seldom necessary or feasible to decontaminate the entire area. Vital parts are decontaminated: roadways, small sections used for operations, and materiel which must be used immediately. The rest of the area is left to action of the weather.

b. Methods. Incineration is usually the most practicable method if it is permitted, if there is sufficient vegetation to produce a hot fire, if flames can be controlled, and provided there are no pools of blister gas. (Such pools cannot be decontaminated by incineration alone.) Otherwise slurry or dry bleach are preferable. The least satisfactory method is a mixture of dry earth and bleach; too much labor and time are entailed. Camouflage is always necessary; pigment may be used to camouflage bleach.

c. Factors. In the final analysis, selection of the method depends upon:

- Size of area.
- Importance of area.
- Materials available.
- Time available.
- Personnel available.
- Proximity of friendly and enemy troops.
- Transportation.
- Fire hazards.

d. Alternate method. An alternate method must be selected, as in all decontaminating operations.

e. Fire control. Fire control measures must be taken if incineration is used. One or more power-driven apparatus are filled with water, manned by crews, and held ready for emergency use. When fighting a fire, crews



Fig. 33. Incineration is quick; it saves time and labor. Always consider it when you have a contamination problem



mount their apparatus in the same positions they use to spray slurry. Trucks approach the fire from the burned-over side, spraying water under high pressure. They never are driven upwind into the path of the fire.

61. ROADS. a. Techniques of road decontamination vary slightly from those used for area decontamination. Easier and quicker methods may frequently be employed. For example, hard roads may be flushed with water under extremely high pressure. If available, graders may be used as an expedient to push contaminated surface earth to one side. Dry bleach or sand shoveled from trucks may also be used, but sand is only a temporary measure. On hard-surfaced roads a mixture of gasoline and drain oil may be sprinkled and ignited.

b. Special considerations must be kept in mind when decontaminating roads:

- There is no choice of area to be decontaminated; the entire roadway must be worked over.
- Less time may be required than for normal area decontamination, since the surface in this case is a long and comparatively narrow band.
- Dispersion and concealment are difficult on roads, thus making personnel more vulnerable to air attack.
- Camouflage is extremely important after decontamination.

62. AIRFIELDS. The enemy contaminates airfields in order to ground our planes, usually in preparation for attack. Decontamination essential to operations must therefore be carried out immediately, especially on aprons and control buildings. A coating of dry bleach usually suffices for runways and aprons, but if there are contaminated shell holes these must be filled in with contaminated earth and covered with a thin layer of bleach. Building decontamination is described in paragraph 63. Decontamination of vehicles, and similar materiel is described in paragraph 64 and in TM 3-220.

63. BUILDINGS. a. Methods. Buildings contaminated on the inside may be burned if they are not essential to normal operations, using thermate grenades to start the fire; such buildings may also be posted and left to action of the weather. If decontamination measures are to be taken, immediate action is necessary because porous building materials absorb blister gases and give off vapors for some time. Power-driven apparatus are used on outside walls, or slurry may be carried in buckets and applied with brushes. The latter method may also be used inside the building.

b. Repeated treatment. Repeated treatment may be necessary since buildings are especially difficult to decontaminate. The unit commander should have tests made (especially in warm weather) to insure complete decontamination.

64. VEHICLES. a. Removal of gross contamination. Gross contamination on the underside can be removed by wallowing vehicles in a trough filled with slurry. Gross contamination on upper surfaces must always be wiped off immediately to prevent absorption of the blister gas by painted or greasy surfaces.

b. More complete decontamination. Hot water and detergent are normally used for more complete decontamination; this usually makes vehicles safe for ordinary use. Painted and greasy surfaces are decontaminated first. Extra cleaning with DANC usually is necessary if the vehicles are to be repaired, to prevent injury to maintenance personnel. Surfaces to which DANC is applied must be washed.

c. Treatment of ground. Where parked vehicles have been contaminated, the ground is decontaminated if the area is to be used again, but under most conditions it is more feasible to decontaminate the vehicles and move them to another park site.

d. Treatment of large numbers of vehicles. An assembly line system of decontamination may be established where a large number of vehicles is involved; personnel may be designated to treat various portions of the vehicles.

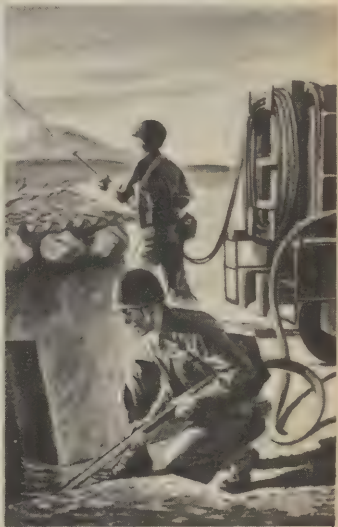
65. AMMUNITION DUMPS AND SUPPLY DEPOTS. Wooden boxes are decontaminated first to reduce hazard of contact. Canned food may be decontaminated by boiling cans in water. The Medical Corps is consulted regarding disposition of other contaminated foods. Contaminated clothing is placed in airtight cans or gas resistant sacks M1, and sent to the quartermaster depot for laundering, unless decontamination by aeration or laundering can be accomplished locally. If proper preventive measures have been taken, such as storing boxed supplies under tarpaulins or in buildings, decontamination is usually limited to grounds, tarpaulins, and building surfaces. Under conditions of extensive contamination, it may be feasible to decontaminate and move all salvageable materiel to another depot site, burning the old depot. Such a decision is the responsibility of higher authority.

66. ORDNANCE MATERIEL. Procedures vary greatly with the type of equipment involved. Reference is made to TM 3-220 for methods. As with vehicle decontamination, assembly line methods may be established if a large amount of equipment is involved. In any case, the unit commander must make a comprehensive survey before starting such a project, assigning each man to best advantage.

67. DEMOLITIONS. These are burned when possible. If burning is not feasible, large quantities of slurry are sprayed on the demolition, left for several hours, then washed in with water. This is necessary because demolitions are usually contaminated very heavily, and the war gas has probably penetrated well into the debris. Spraying and washing should be repeated until thorough neutralization is achieved.



Fig. 34. Miscellaneous uses of 400-gallon apparatus: bathing, fire fighting, and pumping out flooded dugouts



Section IV—MISCELLANEOUS OPERATIONS

68. INTRODUCTION. Because it has facilities for carrying, pumping, and spraying liquids, the decontamination company can engage in numerous miscellaneous operations at the direction of the chemical officer. Secondary missions must not be allowed, however, to interfere with prompt and efficient execution of decontaminating missions, and personnel must not engage in any type of secondary mission which might cause damage to equipment. Since any of several liquids may be carried in the apparatus in the course of secondary operations, the tank must be cleaned thoroughly after each such mission.

69. MISSIONS. Most secondary missions require normal operating procedures. Little or no special training is needed. They may generally be divided into four categories:

a. Spraying water. The power-driven apparatus is used as a field bathing truck, for washing vehicles and other equipment, and for fire-fighting. Personnel and apparatus are always kept upwind of fires.

b. Spraying other liquids. In emergencies, the apparatus is highly satisfactory for spraying water-soluble paint and insecticides. Thorough flushing of equipment is essential immediately after such operations.

c. Hauling. Water and other inert liquids may be hauled for considerable distances. *Corrosive chemicals or chlorinated solvents must not be placed in the apparatus.*

d. Pumping. The apparatus is useful for pumping water and other noncorrosive liquids. (Liquids which injure metal or rubber parts must never be placed in the apparatus.)

e. References. Use of the apparatus for general fire-fighting work is covered in TM 5-315, and for airplane crash fire-fighting, in TM 5-316.

RECONNAISSANCE PROBLEM

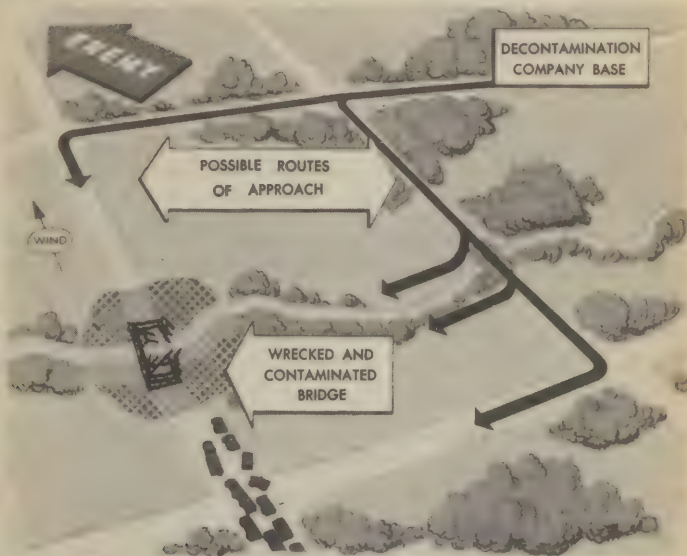


Fig. 35. Reconnaissance of contamination

SITUATION: The company, in bivouac, has been ordered to decontaminate a wrecked bridge and surrounding terrain so that debris may be cleared away to permit immediate repair. Enemy action is reported along the highway, north of the damaged bridge. All traffic bottlenecked at the bridge is diverted to other roads. In selecting a route of approach for decontamination personnel and equipment, the reconnaissance party must select one that (1) avoids principal roads vulnerable to enemy attack (2) uses all available concealment (3) does not interfere with friendly traffic.

PROCEDURE: The party approaches from upwind, carrying improvised signs to post the affected area and detector equipment to identify the war gas. All members of the party search for indications of contamination. Boundaries of the contamination are determined and posted.

Decisions are then made by the platoon leader on these points:

(1) Can the contamination be burned effectively? (Quick completion of the mission is always essential; therefore, the possibility of incineration is explored immediately.)

(2) What methods of decontamination can be used? (If incineration is not feasible, the next best means should be selected. An alternate method must also be chosen for use in an emergency.)

(3) Where is the area on the map? (It should be marked off. If no map is available, a sketch is made.)

(4) How extensive must the decontamination be? (Treatment is limited to that which is absolutely essential.)

(5) What is to be decontaminated first? (Materiel which most readily absorbs blister gases receives first consideration.)

(6) If vehicles or other machinery are involved, should they be decontaminated in the area or removed to another place for decontamination?

(7) What supplies will be needed, and what quantities?

(8) How much time is required for the job?

(9) What route of approach is to be used? (An alternate route should also be selected.)

(10) How, exactly, is the job to be handled? (That is, from which direction is the work to start? How are men and equipment to be dispersed?)

- (11) How is the security force to be stationed?
- (12) Where is the personnel decontaminating station to be situated?
- (13) Where is the mess supply point to be located?
- (14) Where is the supply dump to be located?
- (15) Where is the platoon supply post to be located?
- (16) Where is the nearest source of water?

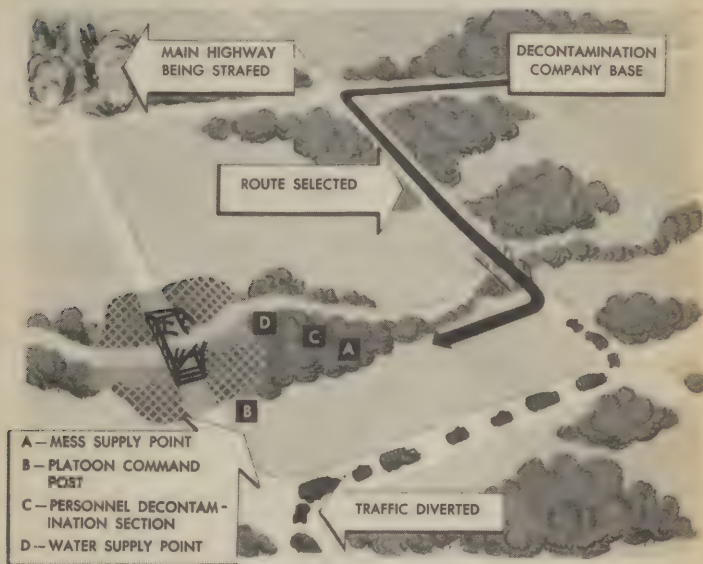


Fig. 36. Solution of contamination situation problem in fig. 35

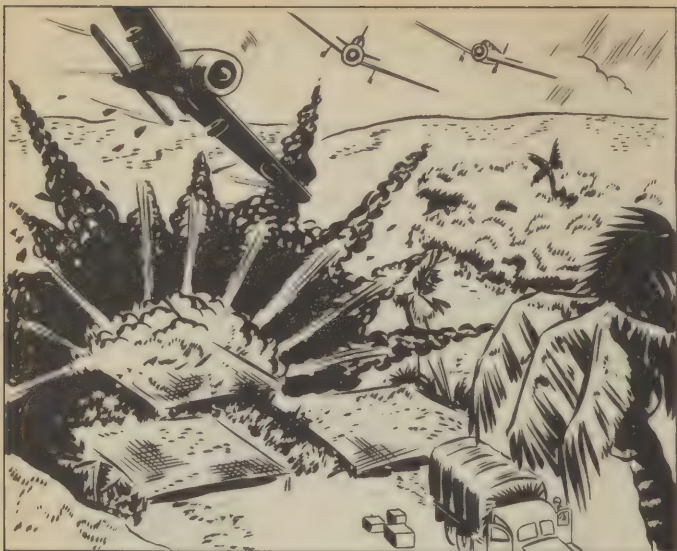


FIG. 37. SITUATION: A DISTRIBUTING POINT IS ATTACKED BY AIRPLANES WHICH DROP MUSTARD GAS BOMBS. ALL MATERIEL IS STORED OUTDOORS IN BOXES COVERED BY TARPULINS, MOST OF THE BOXES BEING DISPERSED UNDER TREES.

Salvage of materiel is the first consideration. Boxes, from which tarpaulins have not been blown by the explosive blast, are usually free of contamination.

Remove contaminated tarpaulins. Burn them, or spread them out to aerate in an isolated field.

Inspect contents of broken boxes. Salvage this materiel and decontaminate it, if feasible.

Decontaminate with slurry or DANC the unopened packing boxes which have been contaminated.

If terrain and vegetation are contaminated heavily, the distributing point is moved.



FIG. 38. SITUATION: A CHEMICAL DEPOT IS ATTACKED BY PLANES WHICH DROP HE BOMBS, SHATTERING SEVERAL CONTAINERS FILLED WITH LEWISITE.

If unaffected containers and depot facilities can be moved far enough for protection, the contaminated area can be covered heavily with gasoline and crankcase drainings, then burned. (Several power-driven apparatus filled with water must be kept ready to fight the fire in case it gets out of control.) Any pools of liquid blister gas remaining after incineration can be decontaminated with slurry.

As an alternative, heavy drenching of the affected area and equipment with water will cause hydrolysis resulting in the formation of solid. This solid gives off no vapor but endangers personnel when it comes in contact with the skin. Therefore, personnel should remain away from the area.

If debris can be cleared from the area, the soil may be worked over by a road grader, bulldozer, or plow, thus covering a major part of the contaminated surface with several inches of earth.



FIG. 39. SITUATION: CROSSROADS ARE HIT BY HEAVY ARTILLERY, FIRING HE AND MUSTARD GAS SHELL.

Traffic must be diverted from the intersection if it interferes with repair or decontamination. (Vehicles can be driven over contaminated areas without danger to masked personnel, although contact with liquid mustard gas must be avoided.) Contaminated shell holes are treated with slurry or dry bleach and filled in. Dry bleach is then spread by hand on other affected areas. An alternate and partially effective method is to spray the highway with a mixture of gasoline and crank-case drainings, and to ignite the fuel.

If the highway is dirt or gravel, work over the soil with a road grader or bulldozer. Haul in uncontaminated earth to fill shell holes. If contamination remains after this treatment, cover the road with slurry or dry bleach.

It is highly important that bleach be camouflaged, either by adding pigment or by mixing it with earth.



FIG. 40. SITUATION: A BRIDGE CROSSING A WIDE RIVER IS CONTAMINATED BY LOW-FLYING ENEMY PLANES SPRAYING MUSTARD GAS AGAINST A TROOP COLUMN IN CONNECTION WITH AERIAL MACHINE GUN ATTACK.

Contamination from airplane spray is normally very light and soon disappears through action of the weather.

The bridge should be posted immediately, although there need be no interference with normal traffic, provided personnel mask while crossing it. Shuffle areas are installed at either end of the span.

A pathway of dry bleach may be laid across the bridge if warranted, but it must be camouflaged to prevent aerial detection by the enemy.

If the bridge floor is concrete, a heavy drenching with water washes it clear of surface contamination.



FIG. 41. SITUATION: ENEMY PLANES ATTACK A SMALL VILLAGE SUSPECTED OF HOUSING MILITARY INSTALLATIONS, DROPPING HE AND MUSTARD GAS BOMBS. THE VILLAGE DOES NOT CONTAIN ANY MILITARY INSTALLATIONS.

The village must be evacuated immediately. Reconnaissance details move in, making a thorough study of the situation. Incineration is usually indicated for at least part of the job. Among factors to consider:

- *If contamination is spotty, badly affected buildings are burned, after equipment of military value is removed.*
- *If contamination and destruction are very heavy, it may be advisable to burn the entire village, after equipment of military value is removed.*
- *If destruction is light but contamination is heavy, guards are posted around the village. Decontamination is then left to action of the weather.*



FIG. 42. SITUATION: A LARGE NUMBER OF ARMORED VEHICLES, HEAVILY CONTAMINATED IN COMBAT, HAVE BEEN BROUGHT TO THE REAR AND MUST BE DECONTAMINATED IMMEDIATELY PRELIMINARY TO MAKING REPAIRS.

Decontamination is somewhat simplified by the fact that only the vehicles are contaminated, whereas the ground on which they stand is free of war gases.

First, remove gross contamination on underside of vehicles by driving them through a trough or wallow containing slurry. Hot water and detergent provide the quickest and most satisfactory method of cleansing other surfaces. Large quantities are needed, and each vehicle must be drenched thoroughly. Special attention must be given to undercarriages. DANC can be used on interior surfaces and where especially careful decontamination is needed prior to repair work. The assembly line system can usually be employed effectively, if contaminated vehicles can be driven under their own power to the decontaminating site.

Detector devices are used following decontamination to make certain all immediately dangerous contamination is removed from vehicles and ground.



FIG. 43. SITUATION: THE RETREATING ENEMY HAS EXPLODED MUSTARD GAS LAND MINES TO CONTAMINATE A LARGE DEMOLITION WHICH CONTAINS SALVAGEABLE MATERIEL.

Salvage of enemy materiel is usually considered incidental to the job of removing contamination. During reconnaissance, the commander notes valuable materiel which may be salvaged quickly. Properly protected crews are then sent in to remove this materiel, but extreme care is taken to avoid booby traps; if possible, men with training in removal of antipersonnel devices accompany the work crews.

When salvageable materiel is removed, the demolition is burned.

If incineration is impossible, the demolition is sprayed heavily with slurry, flushed with water, and sprayed with slurry again. This action is repeated until all signs of contamination are removed or an effective seal is obtained.



FIG. 44. SITUATION: A VEHICLE PARK IS ATTACKED FROM THE AIR WITH HE AND MUSTARD GAS BOMBS.

If contamination is restricted to a well-defined area, affected vehicles may be towed away and decontaminated without interfering materially with operations in the rest of the vehicle park.

If the entire park is contaminated, it is evacuated. All vehicles are removed for thorough decontamination. Complete job is essential in the case of damaged vehicles which must be repaired, since maintenance personnel will be burned during repair work unless all traces of war gas are removed, or unless they wear impregnated gloves.

An assembly line system of decontamination may be set up, personnel being assigned to decontaminate certain portions of each vehicle. Gross surface contamination is wiped off. Painted metal surfaces, greasy surfaces, and wooden surfaces are then treated. Unpainted metal surfaces come next. Procedures for decontaminating vehicles are outlined in TM 3-220.

If the vehicle park is completely evacuated, decontamination of terrain and foliage may be left to action of the weather, provided the area is not too near other installations.



FIG. 45. SITUATION: AN ENEMY AIRPLANE ON A SPRAY MISSION IS ATTACKED BY ONE OF OUR PLANES. THE ENEMY PILOT JETTISONS SPRAY TANKS FILLED WITH MUSTARD GAS, WHICH BURST IN AN OPEN FIELD. THEY CONTAMINATE A FAIRLY LARGE AREA ABOUT 1 MILE FROM A SUPPLY DEPOT.

If the affected area is isolated, and if prevailing winds do not carry fumes downwind to friendly personnel, the contaminated area may be posted and left to action of the weather. If decontamination is necessary, the area may be sprayed with fuel and ignited, but power-driven apparatus filled with water must be held ready to fight the fire in case it gets out of control.



FIG. 46. SITUATION: THE RETREATING ENEMY HAS WRECKED A GROUP OF BUILDINGS AND CONTAMINATED THEM HEAVILY WITH LEWISITE.

Immediate incineration is probably indicated, but a survey is made first to determine whether any materiel is salvageable and whether any part of the demolition must be sprayed with fuel to guarantee incineration.

If incineration is impossible, the area is posted to a safe distance with gas warning signs, and is left to action of the weather. Decontamination of such an extensive demolition is not feasible.

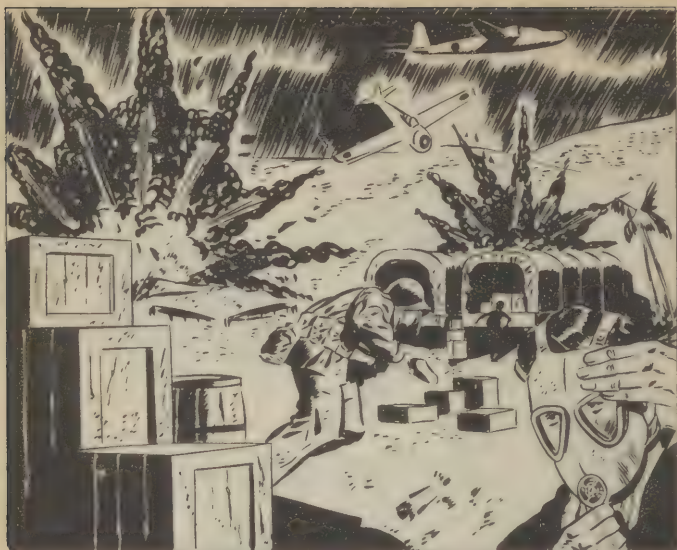


FIG. 47. SITUATION: ENEMY PLANES DROP MUSTARD GAS BOMBS ON QUARTERMASTER DEPOT WHERE FOOD IS BEING LOADED ON TRUCKS FOR DISPATCH TO TROOPS.

Decontamination of food, buildings, vehicles, and terrain is involved here. Details are appointed for each task.

Canned food is boiled to decontaminate the cans. If cans of food are packed in wooden cases, it may be possible to limit decontamination to scrubbing the cases with slurry. The Medical Corps is consulted regarding disposition of other contaminated foods.

Vehicles are removed from the area and washed thoroughly, using hot water and detergent, if possible. This is usually sufficient treatment to remove the light contamination caused by spray.

Buildings are also sprayed with slurry or hot water.

Terrain is sprayed with a light coating of slurry, but the slurry must then be camouflaged.

Decontamination proceeds in the sequence given above; that is, food first, then vehicles, then buildings, and finally terrain.

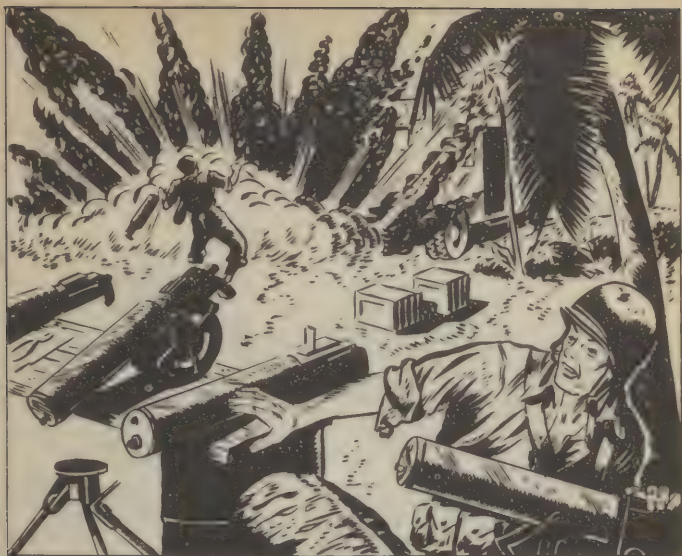


FIG. 48. SITUATION: MUSTARD GAS BOMBS ARE DROPPED ON ORDNANCE DEPOT WHERE MAINTENANCE PERSONNEL ARE WORKING OUTDOORS REPAIRING SEVERAL DOZEN MACHINE GUNS.

Decontamination of weapons would normally be left to using personnel or maintenance personnel, but the decontamination company may be called upon to help remove such extensive contamination. Only preliminary decontamination—enough to permit safe handling—is done on the spot, before the weapons are moved to an area free from contamination.

Large quantities of hot water and detergent are sprayed on the guns. An assembly line detail is established immediately to wipe the weapons dry and oil them before they become rusted.

DANC may also be used, but it must be washed off very soon to prevent corrosive damage to the weapons.

Contaminated buildings and grounds are treated with slurry.



Fig. 49. Unless bleach is camouflaged enemy observation will spot it!

CHAPTER 6

SECURITY AGAINST ENEMY ACTION

70. INTRODUCTION. The enemy can be expected to resist our attempts to neutralize or remove war gases. Such resistance is generally by aerial attack, although armored or ground attack may occur if the company is operating on a special mission in forward areas. Most of the company's security measures are passive, but personnel must be ready at all times to defend themselves and their equipment.

71. RESPONSIBILITY. a. General. The company commander is responsible for security measures. Since the company seldom works as a unit, the commander delegates to platoon leaders the responsibility of formulating a plan of action for use in case of attack. This plan is determined during reconnaissance, and may therefore be supervised in many cases by the company commander.

b. Specific measures. The company commander or platoon leaders to whom he has delegated the responsibility must arrange the following definite security measures:

- Assignment of security duties to personnel.
- Establishment of a gas alarm system.
- Dispatch and location of observers.

- Relay of information regarding enemy activity to company headquarters.
- Inspection of personnel and dispatch of casualties.
- Installation of necessary camouflage.
- Organization and supervision of active defense if attacked.
- Digging of fox holes for each man.

72. PASSIVE SECURITY MEASURES. a. **The air warning system** is coordinated with that of higher units. Observers are posted to report enemy aircraft and watch for chemical and incendiary attack. If enemy planes attack with persistent war gases, observers make note of contaminated areas and report them to company headquarters so the areas may be posted immediately. If a fire is started, observers immediately sound an alarm and attempt to extinguish the blaze.

b. **Lights are blacked out** in case of night attack.

FIG. 50. DEFENSE OF A DECONTAMINATION MISSION, USING EXTRA PERSONNEL FROM AMONG THE 15 BASICS IN COMPANY HEADQUARTERS.

NOTE: The .50-caliber machine gun and rocket launcher are set up near one another in order that maximum fire power can be placed on any given spot. The machine gun is located so it can be used either as an antitank or antiaircraft weapon. Both the machine gun and rocket launcher must have the best possible field of fire.

Observers on the hill at top of drawing are armed with .30-caliber rifles. They give the alarm if hostile elements approach.

Men armed with carbines guard stream on either side of contaminated bridge, preventing infiltration along the banks.

When the situation permits enemy attack from several directions, guards are placed at positions where attack is most likely to occur. The machine gun and rocket launcher are kept at platoon headquarters, being dispatched in any direction upon call from the guards.

Men engaged in decontamination dig fox holes and are prepared to help ward off attacks.



3 MEN WITH
MACHINE GUN

2
OBSERVERS
ON HILL

2 MEN WITH
ROCKET
LAUNCHER

WRECKED AND
CONTAMINATED
BRIDGE

The company complies with blackout regulations established by higher command.

c. Water is stored in canvas tanks at convenient locations for fire-fighting, if not quickly available from natural sources. Personnel are detailed as fire-fighting crews and instructed in their duties.

d. Protection against chemical attack is essential to normal operation of the company; therefore, this phase of defense should cause little difficulty. In static situations, gasproof shelters are provided as rest stations during prolonged attacks. Facilities for personnel decontamination are provided both at field stations during operations and at the base of each unit.

73. ACTIVE SECURITY MEASURES. The company normally avoids seeking combat but, when attacked, defends itself with all available weapons. Active defense is divided into three categories:

a. Defense against air attack. The truck equipped with a .50-caliber machine gun travels at the center of the column of platoon trucks and fires at attacking enemy planes. When not otherwise engaged, the machine gun-equipped truck occupies a favorable firing position during decontaminating operations and is held ready to engage attacking aircraft. Often it may be more feasible to detach the machine gun from the truck and emplace it on the ground near the scene of operations.

b. Defense against mechanized forces. (1) Each platoon is equipped with one antitank rocket launcher for antimechanized defense. This weapon is carried in the supply truck and personnel will be assigned to man it if needed. When mechanized attack occurs, however, all vehicles which can escape by increasing their speed in the direction of travel should do so. If such an escape is not possible, the nearest hostile vehicle within effective range is engaged. Rockets are never fired from a vehicle.

(2) When a unit is operating in an area where mechanized attack is imminent, additional antimechanized weapons are attached if possible. Areas subject to attack from any direction are protected by a perimeter defense employing all available antimechanized weapons. Previously established firing positions are prepared, and are occupied immediately if needed.

c. Defense against enemy patrols. Decontamination troops attacked by enemy patrols deploy, take cover, and actively engage the enemy. If possible, vehicles are sent to protected areas to avoid damage by enemy fire.

74. CAMOUFLAGE. Concealment is utilized to the fullest extent, all operations and installations being hidden from aerial and ground observation as thoroughly as possible. Commanders must study terrain over which their units move and work, with a view to utilizing all available natural concealment. Special attention is directed to vehicles and vehicle parks, camp sites, supply dumps, filling and mixing sites, and decontaminated areas and equipment.

(Pigments may be mixed with dry bleach or slurry to make the color blend with that of surrounding terrain, or natural materials may be placed on top of the bleach after decontamination.)

75. DESTRUCTION OF MATERIEL. When circumstances force abandonment of chemical warfare materiel in the field, it is destroyed or rendered useless to the enemy. It is the responsibility of the company commander to establish a standing operating procedure whereby each unit commander destroys his equipment and supplies should he be unable to prevent their capture. Destruction may be accomplished by burning, slashing, exploding, or submerging in water. Methods for destruction of decontamination materials and equipment are fully covered in TM 3-220, TM 3-221, and TM 3-222.

CHAPTER 7

SUPPLY

76. INTRODUCTION. **a. Responsibility.** The company commander is responsible for all phases of company supply, but he delegates this task to an officer, designated as the supply officer, who is in direct charge of procurement, security, serviceability, storage of company equipment and supplies, and records and inventories. The supply officer is assisted by a supply sergeant.

b. Problems. Problems of regular company supply are the same as those of any other service company. Full details are given in TM 12-250. Many unusual problems are encountered in procurement and issuance of decontamination supplies, however, because of limited transportation and need for special care in storage.

c. Transportation. Only one vehicle is assigned for general company supply, a 2½-ton truck with a 1-ton trailer. The ¼-ton truck assigned to company headquarters may also be used in emergencies, as may supply trucks assigned to individual platoons. Use of platoon trucks is usually necessary to establish adequate reserves of decontaminating materials and for field messing when platoons are operating away from the company base.

77. GENERAL DECONTAMINATING SUPPLY PROBLEMS. Supply needs vary considerably depending on whether the company's situation is static or extremely mobile:

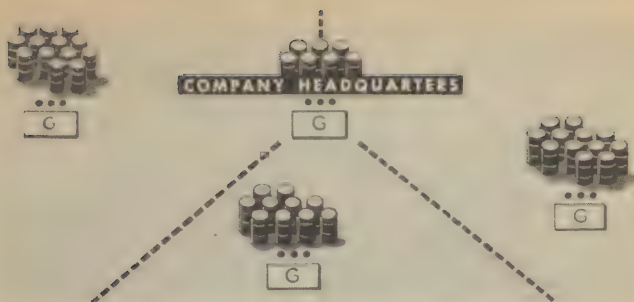


Fig. 51

a. In static situations (fig. 51), where each platoon is permanently assigned to handle a definite sector, sub-depots are built up in advance at each platoon base (one platoon being retained at company headquarters).

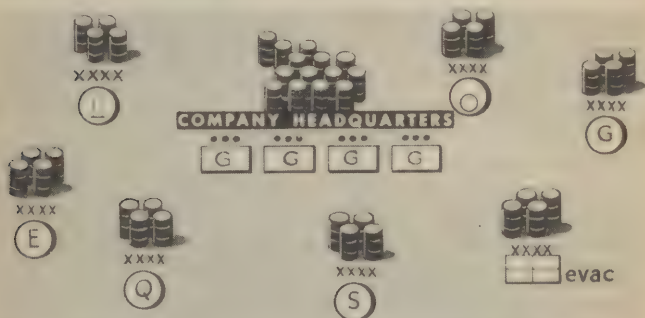


Fig. 52

b. In situations where all platoons operate from company headquarters (fig. 52), but where certain definite installations have been designated for protection by the company, supplies of decontaminating materials are cached near these installations to be available for immediate use.

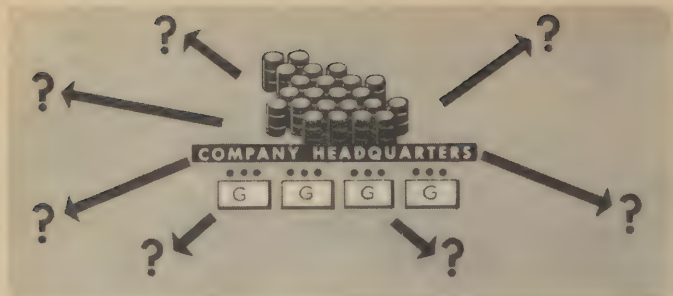


Fig. 53

c. In situations of high mobility (fig. 53), when the company cannot anticipate its missions, it is advisable to build up a sizable reserve supply at the company depot. Under these conditions, it is highly probable that the unit will need additional transportation from the supported unit for emergency operations.

78. WATER SUPPLY. a. General. Decontamination platoons normally obtain their own water from whatever sources are available. The source should be as close as possible to the scene of operations. In static situations, and in all other circumstances where feasible, large canvas storage tanks are used. These are kept filled at strategic points for possible future use. Power-driven apparatus not being used for decontaminating operations may also be used to haul water.

b. Sources. Streams are the most common sources of supply. When water is drawn from shallow streams, an improvised settling basin is made by deepening a portion of the stream to avoid clogging the apparatus with silt, leaves, or other foreign matter. If banks of the stream are such that the apparatus cannot be driven near the water, the centrifugal pump and auxiliary hose are used. Sea water is satisfactory for mixing with bleach.

c. Heating. Water is normally heated to about 180 degrees Fahrenheit for hot-water operations with the standard water heater. If this is not available, gasoline or oil drums may be placed over a heating trench, one power-driven apparatus being used to fill the drums with cold water as the supply is expended.

79. SUPPLY OF DECONTAMINATING AGENTS.

These supplies are usually made available to the company in the form of credits at the army depot. (See FM 3-15.) Transportation from the army depot is the company's responsibility. Since one platoon may use as much as 3 tons of bleach per hour, careful planning is required to insure an adequate supply. When possible, supplies are transported from the army depot by a convoy composed of all platoon supply trucks and



Fig. 54. Construction of a settling basin

trailers. Normal security measures are taken during such missions, and use of roads will be coordinated with use being made by other organizations in the area.

80. DISTRIBUTING POINTS. These are created to provide reserve supplies of materials and to facilitate operations. A distributing point is set up *near the scene of operations*, if all platoons are working close together, or *individual points* are set up for each platoon in dispersed operations. Normally a 2- or 3-day supply is maintained. The following points must be considered when establishing a distributing point:

- Availability to using personnel.
- Concealment.
- Advantageous position in the road net.
- Ground which is dry.
- Terrain which offers natural protection from mechanized, aerial, or patrol attack.

APPENDIX I

USE OF ENEMY DECONTAMINATING SUPPLIES

1. INTRODUCTION. Enemy decontaminating supplies, when captured undamaged, are used by the decontamination company whenever use of such supplies is practical. This effects savings both in materiel and in transportation. Before using captured decontaminating supplies, however, the company commander should test the materiel by an actual decontamination, or send samples to the chemical laboratory company for tests. Enemy decontaminating supplies vary widely in strength. The amount of enemy supplies required for a given mission may therefore vary widely from the amount of standard materials required for the same mission.

2. GERMAN DECONTAMINANTS. The German army uses the following decontaminating supplies:

a. Losantin. This is a mixture of calcium hypochlorite and calcium hydroxide, and may be used dry or mixed with water. It is packed in 25 kg- (55 lbs.) and 50 kg- (110 lbs.) drums painted field gray.

b. Decontaminant 40. This material is used dry, being rubbed over the article to be decontaminated. After 5 minutes it is brushed off or washed off with water. Decontaminant 40 destroys all blister gases, including the nitrogen mustards, and may be used to decontaminate ground. It is packed in 30 kg- (66 lbs.)

and 60 kg. (132 lbs.) drums painted reddish brown and bearing the inscription, "Entg=40," in white on the lid.

c. Bleach. Bleach is also used by the German army.

3. JAPANESE DECONTAMINANTS. The Japanese army is known to have the following decontaminating supplies:

a. Powder. This consists of 19 percent chloramine-T and 81 percent of an inert powder. It may be used dry or mixed with water.

b. Bleach. The Japanese also use a bleach containing 25 percent chlorine.

APPENDIX II

LIST OF REFERENCES

(For unit training)

FM 3-15	Supply and Field Service
FM 17-59	Decontamination of Armored Force Vehicles
FM 21-40	Defense Against Chemical Attack
FM 22-5	Infantry Drill Regulations
FM 25-10	Motor Transport
TM 3-220	Decontamination
TM 3-221	Decontaminating Apparatus M3A1
TM 3-222	Decontaminating Apparatus M4, Power-Driven, 400-Gallon
TM 3-290	Miscellaneous Gas Protective Equipment
TM 5-315	Fire Protection by Troop Organizations in Theatres of Operations
TM 5-316	Airplane Crash Fire Fighting
TM 8-285	Treatment of Casualties from Chemical Agents
TM 12-250	Administration
TM 21-300	Driver Selection and Training
T/O & E 3-217	Chemical Decontamination Company
MTP 3-102	Chemical Warfare Training Program for Chemical Warfare Service Units, Individual Training

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